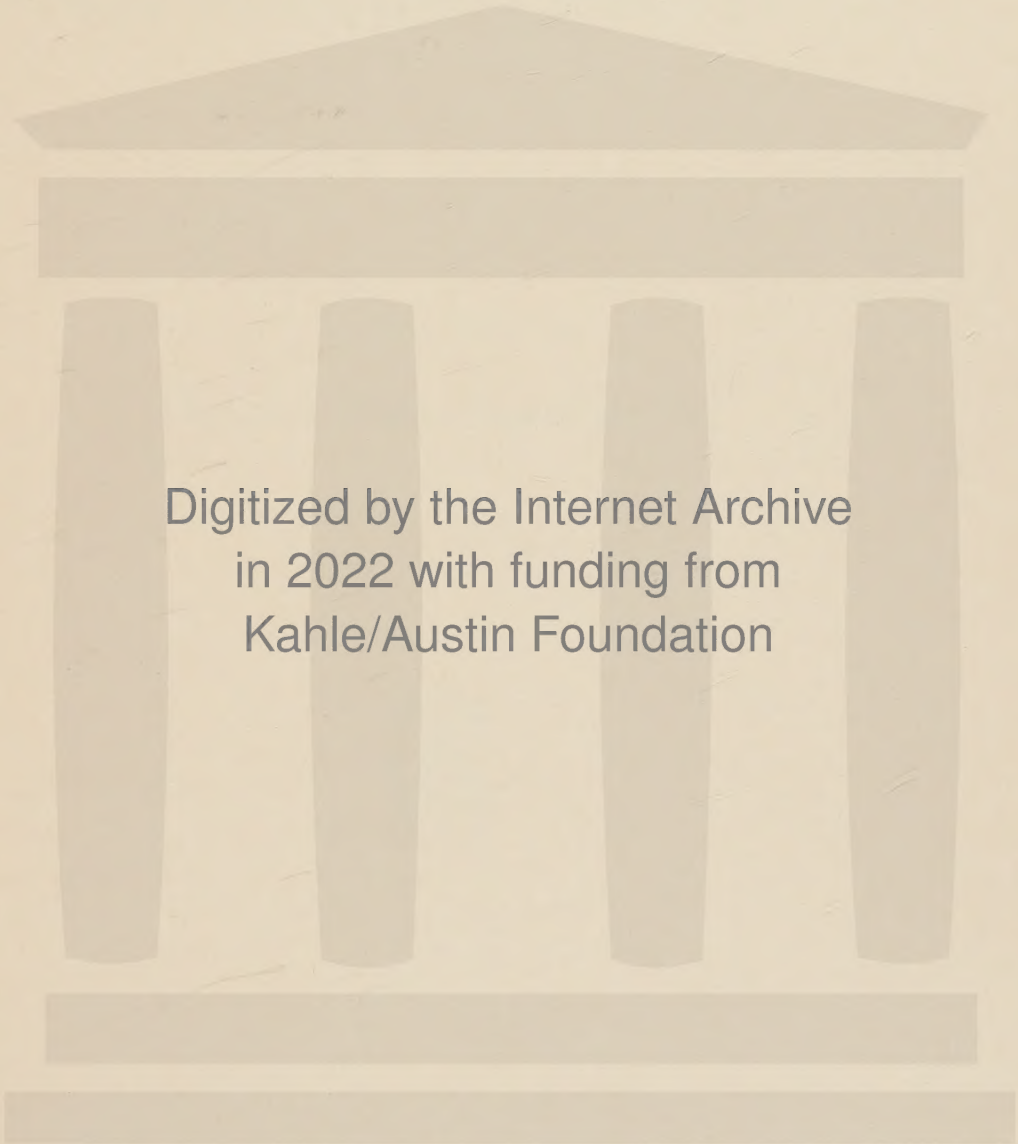

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VOLUME I

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ERRORS IN VOLUME I*

Page 19, col. 1, line 6: *For* 80, *read* 28.†
col. 1, lines 7 f.: *Delete* more than twice as much as her domestic production.

Page 28, footnote 2: *For* Chart 5, p. 35, *read* Chart 6, p. 41.
footnote 3: *For* XXII, *read* XII.

Page 31, Chart 3: *Total for 1923–24 should be plotted as 775.*

Page 49, Note, line 6: *Delete* official statistics convert flour at 75 per cent extraction.

Note, line 7: *After* statistics, *insert* convert flour.

Page 55, Table X (*B*): *Footnote "f" refers to Germany, as in Table XI, not to Austria.*
Table X (*B*): Japanese imports, 1923—*for* 80.3, *read* 28.0.†
Table X: *Interchange* Norway, Sweden.

Page 57, Table XV, line 7: *For* 1909–13, *read* 1910–14.

Page 96, footnote 1: *Delete entire.*

Page 109, col. 2, line 29: *After* December, *insert* 1923.

Page 111, Table 25, line 6: *Read* 1905 5.0 1911 4.5 1923 1.8.

Page 118, Table VI, title: *For* 1923–24, *read* from April 1924.

Page 168, Table V, Argentina: *for months Aug.–Jan., 1924–25, read* 9.1, 5.4, 7.2, 4.6, 7.4, 19.6.

Page 275, col. 2, lines 4 f.: *For* Board of Grain Commissioners, Fort William, Ontario, *read* Dominion Bureau of Statistics, Ottawa.

Page 276, col. 1, line 3: *For* computed, *read* compiled.

Page 333, Chart 2, title: *For* Winnipeg, *read* Chicago.
Chart 3, title: *For* Chicago, *read* Winnipeg.

Page 340, Chart 7, date line: *For* 1909–13, *read* 1910–14.

Page 341, col. 1, lines 39–42: *Delete sentence* Probably . . . . estimate.

* In general, no attempt has been made to revise figures or statements to accord with later information, or to correct minor typographical errors.

†Erroneous figure due to error of International Institute of Agriculture in converting Japanese official figures.

WHEAT STUDIES

OF THE

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VOL. I, NO. 1 STANFORD UNIVERSITY, CALIFORNIA DECEMBER 1924

THE WORLD WHEAT SITUATION, 1923-24

A REVIEW OF THE CROP YEAR

I. CONSPICUOUS FEATURES

In the realm of wheat no two years are alike; each has its peculiarities. The past crop year was more peculiar than most, with bumper crops, international shipments of unprecedented size, extremely low prices, acute depression among American wheat farmers, and a striking recovery of prices late in the crop year. A review of the year has, therefore, special interest and significance.

During most of the crop year wheat prices were on the lowest level since the war. The world over, the purchasing power of wheat over other commodities was lower than for many years. Consequently, much wheat was marketed at a loss to producers, especially in the United States. The depression among American wheat farmers, begun in 1920-21, became acute. Toward the close of the crop year, however, the situation suddenly changed, and by August 1, 1924, wheat prices were some 20 per cent higher than they had been in the spring.

The world wheat crop of 1923-24 was far the largest since the war, and equal to all but the best pre-war crops. Indeed, if one excludes Russia or even Russian domestic consumption, the crop was the largest ever harvested. Good crops were general, and, on the whole, the wheat was of high quality. Canada and Argentina had record harvests; Italy, Spain, Hungary, and Australia had exceptionally good ones. The United States crop, though smaller than any since 1917, was larger than any pre-war crop except those of 1901 and 1914. Russia's crop, though small as compared with pre-war records, was probably the best since the Revolution of 1917. The size of the wheat crop was the more impressive because the preceding world crop had been of fair size and because other cereal crops were also large.

International shipments of wheat and flour were the largest in history, and this despite good crops in most of the importing countries. Shipments to Europe and to Japan and China were of record size. Canada broke all records for export. Russia re-entered the ranks of important exporters with shipments of 66 million bushels of wheat and rye. The bulk of the crop was absorbed during the year, and carryovers were only moderately increased.

This summary of the prominent features of the year raises a number of puzzling questions. Why were wheat prices so low?

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Conspicuous Features
The Low Level of Wheat Prices
The Abundance of Wheat Supplies
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Developments in the United States
Heavy International Movements
Large Stocks and Carryovers
Comparative Stability in Wheat Prices, to May 1924
Marked Changes in Closing Months of the Year
Concluding Observations

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Why did they fall no lower? What caused the striking rise toward the close of the year? What accounts for the exceptional size of the 1923-24 crops? Why did European countries, with much better crops than in 1922-23, import nearly as much wheat in 1923-24? Why did Soviet Russia, with crops insufficient to cover normal domestic needs, make large shipments of bread grains? Why did the United States, with a large exportable surplus of wheat, import 27 million bushels from Canada over the tariff of 30 cents a bushel? How is the exceptional demand from the Orient to be explained? Why was the American wheat farmer so hard hit? Finally, how far are the conditions and tendencies revealed in 1923-24 enduring? How far were they peculiar to the year?

These are significant questions, with a large bearing upon private practice and upon national policy. A careful review of the world wheat situation in the past year, in the light of earlier experience, affords adequate answer to these and similar questions, and furnishes some basis for intelligent interpretation of the very different developments being experienced in the current crop year.

II. THE LOW LEVEL OF WHEAT PRICES

The course of wheat prices during 1923-24 can best be discussed after careful consideration of supplies, demand, movements, and related factors.[1] First, however, it is desirable to get a summary view of the level of wheat prices in 1923-24 in comparison with previous years.

Throughout most of the past crop year,[2] indeed for the year as a whole, wheat prices in terms of gold were lower than at any time since the war; and wheat values, i. e., wheat prices in terms of purchasing power over commodities in general, were generally lower than for the previous thirty years. This was true not of one or two countries only; it was a world-wide phenomenon. This low level is in striking contrast to the high level of wheat prices and values which prevailed during the war and until the summer of 1920, and in some countries even later.

The low level of wheat prices is illustrated by Chart 1, which shows an American, a Canadian, and a Liverpool series, monthly, for five pre-war years and since January 1920, with post-war figures converted to American dollars at current exchange rates. During much of the year prices were not far above pre-war levels. In view of the recovery of wheat prices late in the crop year, and the unlikelihood of any early return to this low level, it seems probable that the past year registered the end of the post-war decline in wheat prices.

TABLE 1.—AVERAGE WHEAT PRICES IN THE UNITED STATES, PRE-WAR AND POST-WAR*

(Dollars per bushel)

Year ending June 30	Farm price	No. 2 Hard Kans. City	No. 1 Dark North. Minneapolis	No. 2 Red Chicago
1909–14	.89	.95	[a]	.99
1919–20	2.22	2.42	3.00	2.24
1920–21	1.85	1.86	2.02	2.22
1921–22	1.03	1.19	1.48	1.25
1922–23	.98	1.13	1.26	1.14
1923–24	.95[b]	1.05	1.24	1.02

* Yearly weighted averages. Sources: U. S. Dept. of Agric., *Yearbook 1923*, pp. 624-627; *Crops and Markets, Monthly Suppl.*, July 1924, p. 226.

[a] Prior to the promulgation of the Federal grades, August 1, 1917, the sub-class Dark Northern was nowhere recognized. The pre-war average of No. 1 Northern Spring was 99 cents.

[b] Unweighted average, using figures for the 15th of each month.

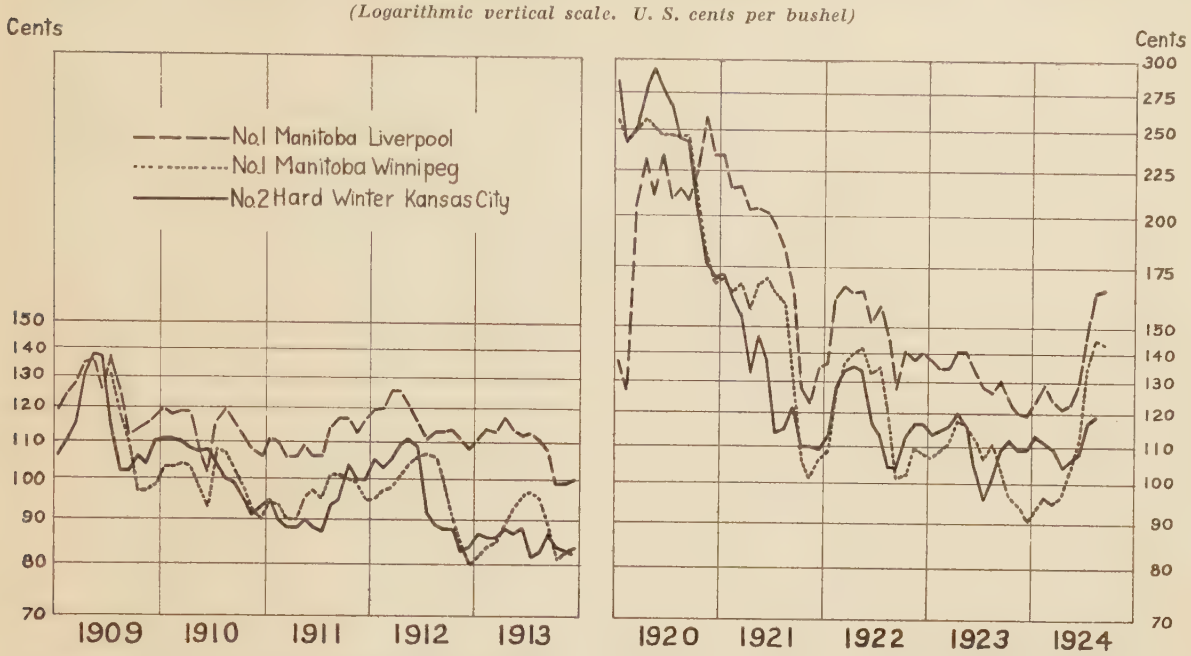
Table 1 shows the same facts more succinctly for the United States, in annual averages for five post-war years compared with a 5-year pre-war average. In the five years before the war the average return to the

[1] See Sections X and XI, below, for detailed discussion of prices in 1923-24.

[2] The term "crop year" is commonly used to apply to a twelve-month period beginning with the month in which newly harvested wheat comes to market in large quantity. Because of variations in harvest dates, this crop year is different in different countries. Considering each country by itself, the United States crop year is regarded as beginning with July; the British with August; the Canadian, Russian, and French with September; the Argentine and Australian with January; and the Indian with April. Because of the importance of the international market centering in England, and the fact that new wheat first comes upon the international market in large quantities in August, the British crop year beginning August 1st is here taken as the standard in discussion of the world wheat situation; but in certain connections it is necessary to consider the crop year characteristic of a particular country.

CHART 1.—AVERAGE CASH PRICES OF REPRESENTATIVE WHEATS, MONTHLY, 1909–13, 1920–24 *

(Logarithmic vertical scale. U. S. cents per bushel)



* Sources: Pre-war prices: Liverpool—Broomhall's *Corn Trade News;* Winnipeg and Kansas City—U. S. Dept. of Agric., *Yearbook 1923.* For post-war prices see Appendix Table XVII.

American farmer for a bushel of wheat was 89 cents, while the market price for leading grades of winter and spring ranged between 95 cents and a dollar. As compared with this, the 1923-24 farm price was 95 cents a bushel, while the market price for winter wheat was $1.02 to $1.05. Spring wheat, owing to scarcity and to tariff protection, was about 20 cents a bushel dearer.

Prices were not only extremely low in 1923-24, but it was the third successive year in which they were low. In 1921-22 wheat brought the farmer an average of $1.03 a bushel; the next year he received 98 cents; but in 1923-24 this had been further reduced by 3 cents a bushel. As compared with a guaranteed price of $2.20 or better received from 1917 to 1920, and an average return of $1.85 in 1920-21, these last three years marked a reduction of 45 to 55 per cent.

A similar comparison of prices in foreign countries would be unprofitable, owing to the great variations in price levels resulting from different degrees of currency depreciation. Nevertheless, it is possible to indicate very roughly the decline and low level of the purchasing power of wheat in a few leading countries, by using prices of domestic wheat and national indexes of wholesale prices.

Table 2 (p. 4) shows the result of such a calculation. For various reasons the decline in wheat values took place at very different rates in different countries, and the degree of depreciation even in 1923–24 was by no means uniform. The figures are consistent, however, in showing that wheat had a universally low purchasing power in 1923-24. In 1919-20 in Europe, and in 1920-21 in Germany, government control kept the level abnormally low. In Canada and the United States, as compared with 110-112 per cent in 1919-20, the level in 1923-24 was about 70 per cent of the 5-year pre-war average. In Germany, France, and Italy, the depreciation was even greater. In England, where the purchasing power of wheat was higher than in most other countries, domestic wheat had only 83 per cent of its pre-war purchasing power.[1] For corre-

[1] In Russia the depreciation of wheat values was even more extreme, for prices in terms of dollars at export points were officially estimated at 62 cents a bushel on September 1, 1923, while prices of industrial products were extremely high. See *Foreign Crops and Markets,* November 12, 1924. Farm prices have been reported as low as 15 to 30 cents a bushel.

spondingingly low levels, one must go back to the severe agricultural depression of the 'nineties.

TABLE 2.—RELATIVE PURCHASING POWER OF A BUSHEL OF WHEAT IN VARIOUS COUNTRIES, 1919–24, ON A PRE-WAR BASE*

Crop years	U. S.	Canada	England	Germany	France	Italy
1909–14	100[a]	100	100	100	100	[b]
1919–20	110	112	77	31	43[c]	[d]
1920–21	95	105	110	53	77	[d]
1921–22	81	89	94	105	69	82[b c]
1922–23	71	74	84	100	70	74[b]
1923–24	70	70	83	64	62	67[b]

* The American estimates were obtained by dividing the average annual post-war farm prices of wheat in the United States (corrected for seasonal variation and expressed in percentages of the base), month by month, by the wholesale price index numbers (on the same base) compiled by the Bureau of Labor Statistics; similarly, the Canadian by the use of prices of No. 1 Manitoba wheat at Winnipeg and the index numbers of the Dominion Bureau of Statistics; the British by the use of the Gazette price of domestic wheat and the *Statist* index number; the French by the use of the price of native red wheat at Chartres and the wholesale price index of the Bureau de la Statistique Générale; the German similarly by the use of the Board of Trade prices at Berlin and the official index numbers (supplemented by Conrad's and Schmitz's indexes for the pre-war period); and the Italian by the use of the prices of domestic wheat at Milan and the general wholesale price index numbers of the Milan Chamber of Commerce.

These estimates give an approximation of the value or purchasing power of wheat in these various countries since the war in relation to its purchasing power in the pre-war period. The figure of 70, for instance, representing wheat "values" in the United States in 1923-24, shows that there had been a reduction here of something like 30 per cent in what a bushel of wheat would buy last year as compared with before the war; or, looking at the matter from the point of view of the consumer, wheat cost 30 per cent less than in the five pre-war years. Similarly, the Canadian, British, and other figures for 1923-24 give an approximation of the purchasing power of wheat within each of these countries in terms of its pre-war purchasing power in that country. Because of differences in the general level of prices in different countries, as well as variations in the domestic wheat prices of different countries, especially pronounced in the post-war period of currency disorders, the resulting figures vary greatly from country to country, and indicate nothing as to the relative prices of wheat in terms of gold.

a Base period for United States is July 1909 to June 1914.

b Base period for Italy is the calendar year 1913. Since wheat prices were low in 1913, the Italian figures are somewhat higher than they would be on a 1909-14 base.

c January to July only.

d Data not available.

A full explanation of the extreme decline, since the war, in the prices and purchasing power of wheat, lies outside the scope of this discussion. It would require separate treatment for each country; for the course of the decline, its causes, and its consequences were far from uniform.

Broadly speaking, however, two influences were of predominating importance. The first was essentially monetary in character, affecting all sorts of commodities,—a reaction from the high levels to which, under the peculiar conditions of the war and its immediate aftermath, prices had risen by 1919–20. In the period of deflation, which occurred in many countries in 1920–22, almost all commodity prices fell heavily, more or less regardless of the special conditions affecting demand and supply in the usual sense. Wheat prices fell among others. Most of the decline in wheat prices in 1920-22 was due to this factor, not to conditions peculiar to the wheat market.

The second influence affected both the price and the purchasing power of wheat: available supplies increased at a rate faster than the demand. In the earlier post-war period an important factor was the release of stocks tied up in Argentina and Australia through lack of shipping, and of government stocks in European countries. In the past three years improved production has been the principal factor. Even though certain ex-European countries, notably the United States, reduced wheat acreage, there has been an upward tendency on the whole, chiefly because of European efforts to restore agricultural output, together with a high rate of production in Canada and Argentina.

Meanwhile, economic conditions in several of the importing countries of Europe were such as to necessitate economies in importing grain, both because unemployment reduced the purchasing power of the population, and because, as currencies fluctuated and export markets for European products were difficult to secure, the importation of wheat was especially expensive. In certain countries, notably Great Britain and Belgium, wheat consumption was reduced rather because higher real incomes of a large part of the workers led to increased consumption of meat and other non-cereal foods. This situation did not cause a reduction in European imports; indeed they have tended upward even though Europe's crops improved, and have been well above the pre-war averages. But it did result in limiting the intensity of Europe's demand for wheat, in preventing a restoration of pre-war rates of wheat consumption, and in making Europe willing

to import heavily only at relatively low prices.

The decline in the value of wheat in terms of other commodities had two important consequences. On the one hand, it made for low costs of living, so far as an important element in the food supply was concerned. On the other, it caused losses to wheat producers except where yields were unusually high. Where, as in the case of the United States and Great Britain, wheat production had been greatly expanded during the war under conditions involving high costs, the resulting depression among wheat producers was especially severe, for these farmers had to compete with low-cost producers in Canada and Argentina. The depression was the more acute because it was so prolonged.

So far as 1923-24 is concerned, the dominant factor was unquestionably the abundance of wheat supplies, in a year when competing foodstuffs were also relatively abundant. To explain how these large supplies were absorbed, and why the price of wheat fell no lower than it did, one must consider the characteristics of the demand for wheat, as displayed in the past year.

III. ABUNDANT WORLD SUPPLIES

To account for the low level of wheat prices, as well as the heavy international movement of wheat, it is necessary to consider the initial "carryover," the crops harvested during the year, and the supplies of important wheat substitutes.

Initial Carryovers. The crop year 1923–24 opened with ample reserves of wheat.[1] In all the principal exporting countries except Argentina and Australia, stocks were well above average. Broomhall's figures showed North American "visible supplies" to be 87 million bushels, as compared with a pre-war 5-year average of 69 millions and a 4-year average, 1919–22, of 58 millions. In the United States, where an unusually bountiful crop had been harvested in 1922, the carryover was especially large. Argentine visible supplies, always an incomplete indication of carryover there, were reported by Broomhall as only 4½ million bushels. Sir James Wilson estimated the exportable surplus at 24 million bushels, somewhat below average though higher than before the war. Australian visible supplies were above pre-war averages, but slightly below figures for the previous post-war years except 1922. Stocks in European countries were probably somewhat smaller than before or since the war,[2] owing to the general abandonment of the policy of government reserves (except in Germany), the small European crop of 1922, good prospects for the 1923 crop, and the ready availability of supplies in exporting countries. Comparable total visible supplies as given by Broomhall, excluding Australian and European continental stocks, were 139 million bushels in 1923, as compared with 120 before the war and 136 in the years 1919–22.[3]

Big Crops. Large world crops, however, were far more important than carryover in creating the abundant supplies of 1923–24.

TABLE 3.—APPROXIMATE WORLD WHEAT CROPS, PRE-WAR AND POST-WAR*

(Million bushels)

Year	Including Russia	Excluding Russia *a*	Including Russian exports only
1909–13	3,743	3,005 *a*	3,070
1913	4,088	3,060 *a*	3,191
1920	3,033	2,894	2,893
1921	3,258	3,116	3,118
1922	3,348	3,156	3,114 *b*
1923	3,692	3,470	3,482 *b*

* Sources: U. S. Dept. of Agric., *Yearbook 1923*, p. 611; *Foreign Crops and Markets*, Sept. 24, 1924, pp. 304-305; final column from unpublished calculations of Department of Agriculture. China is excluded throughout. Comparisons across the table reveal discrepancies but they are not large enough to affect seriously the vertical comparison of figures in each column.

a Post-war boundaries except for 1913.

b Preliminary figures, both probably below the true figures, which are more probably 3,159 and 3,493, respectively.

Table 3 emphasizes this point. Outside the area of Soviet Russia, the 1923 crops were 465 million bushels above the pre-war 5-

[1] See Appendix Tables VII, XIV-XVI, and further discussion in Section IX below.

[2] No comparable data for continental stocks are available. Broomhall's figures for visible supplies in Great Britain and afloat were 47.2 million bushels on August 1, 1923, as compared with 50.6 million bushels for the five pre-war years and 74.3 millions for the first four post-war years.

[3] The addition of Australian and European continental stocks would increase the post-war average on account of large government stocks in early post-war years.

year average, and 410 million bushels above the best pre-war crop of 1913. Even if one adds Russian exports to the pre-war crops outside of Russia, the corresponding 1923–24 supplies were 412 million bushels larger than the pre-war average and 292 millions better than in 1913. In other words, while the bumper crop of 1923 was nearly 100 million bushels below the bumper crop of 1913 for the world including Russia, the decline in production was much more than offset by reduced consumption in Russia; so that the rest of the world was better supplied with wheat in 1923–24 than in 1913–14. Even if one allows for the increased population of the wheat-consuming world, the crops of 1923–24 stand out as exceptionally large.

CHART 2.—WORLD WHEAT CROPS AS ESTIMATED BY THE U. S. DEPARTMENT OF AGRICULTURE, (a) INCLUDING RUSSIA, (b) EXCLUDING RUSSIAN CROPS BUT INCLUDING RUSSIAN EXPORTS, 1905–23 *

(Logarithmic vertical scale. Billion bushels)

* Source: U. S. Dept. of Agric., *Yearbook 1923*, and unpublished figures of the Department.

Chart 2 illustrates the trend of world wheat production by crop years from 1905–06 to 1923–24, Southern Hemisphere crops being each year combined with the crops of the previous harvest in the Northern Hemisphere. The upper curve shows the totals including Russia, for which the data are especially defective. The lower curve shows the totals excluding Russian crops but including exports from Russia. While the slump during the war period stands out most strikingly, the fact to be emphasized is the notable recovery in wheat production since the war and the high level attained outside Russia in 1923–24.

The largest crops, speaking comparatively, were harvested in Europe (excluding Russia), in Canada, and in Argentina. Northern Africa also had an excellent crop, as well as Australia. The Indian crop was one of the best, and the more important from an international standpoint because it followed a crop equally good. In the United States there was a reduction in output, as compared with production in 1922, owing mainly to the 2½-million-acre decrease in the land devoted to wheat. Table 4 shows 1923 crops in various parts of the world in comparison with those of 1909–13, 1921, and 1922.

TABLE 4.—WHEAT PRODUCTION IN LEADING AREAS, PRE-WAR, 1921, 1922, AND 1923*

(Million bushels)

Area	1909-13	1921	1922	1923
Europe (ex-Russia)	1,348	1,216	1,044	1,260
United States	690	815	868	797
Canada	197	301	400	474
British India	352	250	367	369
Argentina	147	191	196	247
Australia	90	129	109	126
North Africa	92	106	70	107
Japanese Empire	32	39	38	37

* See Appendix Table I *(A)* for more detailed data.

High Yields Mainly Responsible for Large Output. This large output was due not so much to the greater acreage harvested in 1923–24 as to the high average yield per acre, or in other words, not so much to special efforts of producers as to the unusually favorable weather that prevailed. Commonly, in any one year the weather is favorable in some parts of the world and unfavorable in others, so that large variations in total production are exceptional. But in 1923–24, in practically all parts of the world, the weather was remarkably favorable to wheat production; the average yield in the most important producing areas of the world was 15.9 bushels per acre, 1.4 bushels greater than for the preceding year, and 0.6 bushels above the 5-year pre-war average.[1]

The rarity of such a coincidence of high yields in various parts of the world has

[1] See Appendix, Table I *(C)*.

been brought out in a recent study of wheat yields per acre in leading producing areas of the world.[1] Dividing the fifteen years from 1909 to 1923 into three 5-year periods and measuring the variation in yield for each of those years from its 5-year average, the International Institute of Agriculture has shown that in 1915 alone were conditions so generally favorable as in 1923. These findings are summarized in Table 5.

TABLE 5.—EXCESS OR DEFICIENCY IN WORLD WHEAT YIELDS PER ACRE, 1909–23

Excess or deficiency from 1909-13 aver.		Excess or deficiency from 1914-18 aver.		Excess or deficiency from 1919-23 aver.	
1909	+1.0%	1914	+2.1%	1919	−8.3%
1910	−4.8	1915	+12.6	1920	−3.1
1911	−1.0	1916	−8.4	1921	+1.0
1912	+1.9	1917	−4.2	1922	+1.0
1913	+1.0	1918	−1.1	1923	+11.5

Coincident with high yields per acre, there was a further increase in the land devoted to wheat production in 1923–24. Exclusive of Russia, the total for the world was 219½ million acres, 2½ million acres greater than in the preceding year, and 23¾ millions above the 5-year pre-war average.[2] Including Russia in the comparison, there was an increase over 1922–23, but a pronounced decrease from the pre-war total.

TABLE 6.—CHANGE IN WHEAT ACREAGE BETWEEN 1922 AND 1923

(Million acres)

Increases		Decreases	
British India	2.6	United States	2.6
Europe	1.3	Australia	.5
Argentina	1.1		
North Africa	.9		
Canada	.3		
Total	6.2	Total	3.1

British India increased her wheat acreage more than any other district, but there were also large increases in Europe, North Africa, and Argentina. In the United States there was a reduction of 2½ million acres, and in Australia a reduction of half a million acres, while in Canada there was a relatively small increase. Table 6 summarizes the principal changes in acreage between 1922 and 1923 in leading producing areas.

More Hard Wheat Available. The quality of the supply was for the most part excellent. Excepting the United States grain, the wheat produced was of high quality. As a result of the increase in the Canadian and Argentine crops, there was also a gain in the ratio of hard and semi-hard wheats to soft varieties. Canada led with 75 million bushels more hard wheat than in the preceding year, and 275 million more than before the war. Argentina furnished a dark wheat of a quality somewhat lower than Canada's, ranking as semi-hard and semi-strong, to the extent of 50 million bushels over the 1922–23 crop, and 100 million over the pre-war average. Similar wheat, of only moderately high quality, however, from the Danube countries, amounted to 40 million more—a total of 165 million bushels of strong hard wheat in excess of the preceding year's supply. Even so, however, the amount available, as compared with the pre-war supply, was not so large as these figures indicate, since a large part of the vanished Russian production had been of this type.

Wheat Substitutes Also Plentiful. The availability and price of other grains which may be used as substitutes for wheat are also factors of importance in the consideration of wheat supplies. Substitution of one grain for another is usually of minor importance in the United States, except as a heavy corn crop may divert some low-grade wheat from stock-feeding to the export market, or *vice versa* when an excess of wheat and a deficiency of corn leads to the use of wheat as feed.[3] But in parts of Southern Europe and in many subtropical countries corn is a staple bread grain; while in northern Europe there is extensive use of rye, the baking qualities of which make it an excellent substitute for wheat. Similarly, throughout much of the Orient, wheat comes into competition with rice. Potatoes, because of their starch content, also serve, especially in Europe, as a substitute for wheat when the latter is in short supply or high in price.

In 1923–24 the large wheat harvest was

[1] *International Crop Report,* January 1924.

[2] See Appendix Table I (*B*).

[3] By "corn," as employed in WHEAT STUDIES, is meant what Europeans call maize.

reinforced by heavy supplies of rye and corn.[1] The rye crop of Europe—the only region where it is in direct competition with wheat—was about 16 per cent greater than the year before, while corn production for the world as a whole was higher by about 8 per cent. Not counting Russian production, the continent had a crop of 826 million bushels of rye, decidedly the largest crop harvested since the war, most of the increase being due to large crops in Germany and Poland. In addition, according to fairly reliable estimates, Russia harvested 549 million bushels, a crop, which although not quite so large as that of the preceding year, permitted an export to other sections of Europe of some 42 million bushels. Continental Europe, outside of Russia, consequently had a supply of rye approximately 150 million bushels larger than in the preceding year.

The European corn crop was also large —better than any since 1920, when the wheat crop was poor. The Danube countries, including Hungary, Roumania, Jugo-Slavia, and Bulgaria, increased their output 52 million bushels (chiefly from Roumania) or almost 20 per cent above the crop of the previous year, while the Italian output showed an increase of 12 million bushels. In the United States, the other most important producing area, there was also a good corn harvest, although not a record crop. The Argentine corn crop was exceptionally large.

Output of the other two leading substitute crops—potatoes (in Europe) and rice (in Asia)—was not so plentiful.[2] German and Polish potato-production was more than 20 per cent below the excellent crops of the preceding year, and in some other countries the decline was even greater. Nevertheless, the crops were not much below average. Statistics of rice-production are especially incomplete and imperfect, but there appears to have been an appreciably smaller supply in 1923 than in 1922, particularly in India, Indo-China, China, and Japan, the leading producing and consuming districts.

The variations in these crops help somewhat in explaining the variations in wheat-consumption in parts of Europe and Asia.

In short, wheat supplies were exceptionally abundant in 1923–24, even compared with pre-war standards, because generally favorable weather conditions brought unusually high yields per acre. The initial carryover was of fair size. Rye and corn crops were also good, especially in Europe. The potato crop, while generally smaller than in 1922–23, was by no means poor, and only the rice crops, of the various wheat substitutes, was short. Abundant wheat supplies were the dominant feature of the year 1923–24.

IV. NOTEWORTHY FEATURES OF THE DEMAND

The demand for wheat may be considered from two points of view,—the purposes for which wheat is used in every country, and the requirements for imports by countries which raise less than their own supplies. Both deserve careful attention, but it must be admitted that on no other phase of the wheat situation is it more difficult to reach reliable conclusions.

Use for Seed, Food, and Feed. Wheat is required chiefly for three purposes: for seed, for manufacture into flour and alimentary pastes, and for feed. The seed requirement varies little from year to year, and changes chiefly according to acreage planted. Thus it is unrelated to price or to the size of the crop except as these may affect new plantings. In 1923–24 the demand for seed wheat was slightly increased. In the United States, indeed, it was considerably smaller, because of reduced plantings. In Europe, however, this demand increased, since the planted acreage was apparently the largest since the war.

The demand for manufacture into flour and alimentary pastes is usually comparatively stable, but it is affected by several factors: the variation in carryover of flour from year to year, in all hands; the price of flour and bread in comparison with other staple foodstuffs such as potatoes, rice, cornmeal, rye flour, and sugar; the influence of prosperity or depression, each of

[1] See Appendix Table II.
[2] *Idem.*

which occasions substitution of wheat products for or by other foods, cheaper or dearer, or affects the absolute amount of food consumption; and trends of national preference, occasioned by changing dietary habits.

In 1923–24, the strength of the demand for wheat as food was favorably affected, except in Germany, by increasing business activity and by relatively higher prices for competing foods, notably potatoes, rice, corn, and sugar; while the universally low level of wheat prices tended to increase consumption of wheat. Moreover, the growing use of wheat in India and the Far East instead of rice, and in Italy and Southeastern Europe in place of corn, although specially stimulated by low wheat prices, apparently constitutes a permanent strengthening of the demand in those countries.

The demand for wheat for feed depends largely upon the price of wheat compared with more typical feedstuffs, and on the amount of livestock requiring feed. The amount actually used for feed, however, depends more upon the average quality of the crop, since low grade or tail wheat is commonly suitable only for feed, and the proportion of this tail wheat varies greatly from year to year.

Though conclusive evidence is lacking, it is safe to affirm that the use of wheat as feed was especially large in 1923–24. In the United States and in Canada the poor quality of part of the domestic wheat was an important factor. This was not true elsewhere, for in most countries the crop was of fair quality or better. But with low market-value for wheat, the tendency was strong for wheat farmers with livestock, who would otherwise have had to buy feed, to use part of their merchantable wheat for this purpose. While the amount of food wheat thus used for feed is small in comparison with the total feedstuffs used, the indications are that it accounts for much of the enlarged "domestic disappearance" of wheat, in both North America and Europe, in 1923–24.

In sum, the world's demand for wheat was probably stronger in 1923–24 than in other years since the war. It was not, however, the intensity of this demand, but rather the exceedingly low prices which caused the exceptional absorption of wheat, through substitution for other foods and feeds to a larger extent than in earlier post-war years.

The International Demand. Prices of domestic wheat in each country are greatly influenced by the quality and quantity of domestic crops of wheat and other cereals, by restrictions on import and export, and by a multitude of other factors. The international price of wheat, however, is determined by the combined strength of the import demands from deficiency countries and the volume of exportable surpluses from exporting areas. Roughly speaking, the effective demands of buying countries and the merchandisable surpluses of exporters tend to be equated at the so-called Liverpool price.[1]

Most important in the group of exporters are Canada, the United States, Argentina, and Australia, with North Africa (except Egypt), British India, the Danube basin, and Russia as minor contributors. The leading deficiency area lies in Europe,—west of Poland, Hungary, and the Balkans, and excluding Spain, which is almost self-sufficing in wheat; but the Far East is taking an increasing amount of wheat, and the West Indies and certain South American countries are of some importance as importers. In spite of the recovery and the growing importance of the ex-European trade, Europe remains the predominant factor on the demand side of the international market, taking over 80 per cent of wheat and flour shipments.[2]

The strength of the European demand for imported wheat depends on numerous conditions, the relative importance of which it is not easy to determine. The size of the domestic wheat crops is one, the abundance and price of wheat substitutes another, while the whole group of financial and trade factors known as "purchasing power" makes an important third. Still other factors might be mentioned. The amount

[1] This statement requires many qualifications, which are reserved for fuller discussion in a later issue of WHEAT STUDIES.

[2] See Appendix Table VIII for Broomhall's figures.

actually imported depends not merely upon the intensity of the demand, but upon the international price: with a given strength of demand, much more will be imported if the price is low than if it is high. The variability of the demand, however, must not be overemphasized. The demand for wheat, as compared with many other commodities, is decidedly inelastic, at least so far as the large fraction for food is concerned.[1] Europe is certain to import at least several hundred million bushels every year. The market problem revolves about how much more than this minimum she will actually take.

European import requirements cannot be accurately forecast by any known methods. This is due partly to imperfect statistics of crops, and partly to variation in invisible carryovers, but much more to variations in the utilization of wheat in different years. Since breadstuffs are so essential an element in the diet, it might be expected that in years of small European crops the volume of imports would be increased correspondingly, and similarly decreased in years of large crops, so as to maintain a fairly uniform supply. Such, however, was not the case before the war, and it has been even less true since the war.

TABLE 7.—EUROPEAN WHEAT CROPS, IMPORTS AND SUPPLIES (EX-RUSSIA), PRE-WAR AND POST-WAR*

(Million bushels)

Crop year	Crops	Net imports	Supplies
1909–14	1,348	405	1,749
1921–22	1,216	518	1,734
1922–23	1,044	548	1,592
1923–24	1,260	527	1,787

* See Appendix Tables I *(A)* and X. Net imports are computed by adding the official statistics for countries reporting net imports and subtracting net exports of Danube countries. These figures are only rough approximations, since crop estimates are far from accurate, import figures are imperfect, and pre-war and post-war figures are not altogether comparable because of boundary changes. Broomhall's figures of shipments to Europe are considerably larger than the sum of officially reported net imports. See Appendix Table IX.

This point is illustrated by Table 7, summarizing European crops (outside Soviet Russia), imports, and total supplies during the past three crop years, compared with a 5-year pre-war average.

The 1922–23 crops were some 170 millions less than in the preceding year, imports only 30 million bushels more, and supplies (neglecting carryover) 142 million bushels less. The 1923–24 crop was 216 million greater than the preceding year, but the imports were only 21 million less, and the supplies 195 million more. Comparing 1923–24 with 1921–22, both years of good European crops, an increase in crops was accompanied by an increase in imports, and supplies were some 53 million bushels greater.

Similar data for leading deficiency areas of Europe individually are difficult to secure, but the evidence supports the same conclusion.[2] Years of large crops tend to be years of large consumption, and years of small crops, of low consumption. It cannot even be inferred that with a larger crop imports will be reduced, or that with a smaller crop they will be increased. The experience in 1923–24 affords a striking example of heavy imports accompanying increased crops, and it is conceivable that 1924–25 may show the opposite,—moderate imports with decreased crops.

The demand from non-European countries is even less predictable. The indications are, however, that it is comparatively elastic, much more responsive to changes in prices of wheat and flour than that from Europe. During the first two years after the war, when world wheat prices were high in comparison with other commodities, shipments to non-European destinations were only about 50 million bushels a year, as compared with a pre-war 5-year average of 82. In the next two years, with lower wheat prices, shipments to non-European destinations were somewhat above the pre-war average; and in 1923–24, with still lower prices, they were 80 per cent higher (according to Broomhall's figures) than the average in the five pre-war years.

The difficulties experienced by even the most expert observers in attempting to estimate importers' requirements are illustrated by figures from Broomhall's *Corn Trade News*, summarized for the past three

[1] The demand for wheat as feed, on the other hand, is probably quite elastic.

[2] See below, pp. 12–18.

crop years in Appendix Table VIII. The early estimates, of course, are somewhat spoiled by the lack of adequate information about crops; while the estimates late in the crop year are improved because of known shipments in the early months. But estimates in November and December show marked underestimates in 1921, a marked overestimate in 1922, and a still more striking underestimate in 1923. It is quite evident that forecasting importers' requirements requires further knowledge, a consideration of more factors, and a better technique than have yet been utilized.

In retrospect, it is clear that the international demand for wheat in 1923–24, from Europe, from the Orient, and from other regions, was greater than had been anticipated, and that importers responded readily to the low prices prevailing throughout most of the crop year. This was due in part to a measure of improvement in European economic conditions, to exceptional conditions resulting from the earthquake in Japan, and to the belated harvests of 1924; but in large part also to the freer use of wheat for food, feed, or both, encouraged by the abundance of supplies at low prices.

V. THE SITUATION IN DEFICIENCY COUNTRIES

The world's principal wheat deficiency region lies in Western Europe, with an adjoining area in Central Europe. The flow of wheat into this low pressure area—to use a meteorological metaphor—is the chief feature of the international wheat movement. The region of lowest pressure, where domestic production is regularly less than imports, includes Great Britain, Belgium, Holland, Norway, and Sweden, as well as Austria and Greece. Of the countries producing more than they import, the most important are France, Germany, Italy, and Czecho-Slovakia.

The region described above as that of lowest pressure—Great Britain, the Scandinavian countries, Belgium, and the Netherlands—imports generally more than twice as much as the region of higher pressure—Italy, France, and Germany, while producing only one-fourth as much wheat as the latter region.

In the international market the importance of a deficiency country is largely dependent upon the quantity imported, not upon the amount produced. Table 8 shows the quantity imported by the chief deficiency countries before and since the war. The United Kingdom is by all odds the greatest single importer of wheat, taking roughly 40 per cent of the total European imports. The position of most of the other countries has been modified by the war and its aftermath. In Europe Italy has supplanted Germany as the second largest importer. Except for 1921–22, when she was sixth, France has been third, whereas she stood fifth before the war. With the exception of 1920-21, Belgium has retained fourth place. In the last two years Germany has been fifth; and, except for 1921-22, the Netherlands sixth. Practically all the countries except Germany show marked increases in imports in 1923–24, as compared with 1922–23 and with the pre-war average.

To present the significant features of international demand for wheat it is essential to discuss the situation in each of the important divisions of the European area, and also in the Far East, which is espe-

TABLE 8.—NET IMPORTS OF PRINCIPAL WHEAT IMPORTERS, PRE-WAR AND POST-WAR*

(Million bushels)

Crop year ending July 31	United Kingdom	France	Germany	Italy	Belgium	Netherlands	3 Scandinavian Countries	Switzerland, Austria and Czecho-Slovakia	Japan
1909–14	217.7	43.6	67.8	53.0	50.2	22.6	17.5	[b]	4.1
1920–21	200.1	68.3	59.8	99.4	32.2	18.9	10.8	45.8	5.8
1921–22	208.2	17.1	69.5	100.5	40.5	19.8	13.0	43.8	24.9
1922–23	211.9[a]	45.6	37.5	115.7	39.5	23.9	22.0	40.3	14.5
1923–24	236.6[a]	53.0	30.9	69.8	40.3	26.7	27.7	56.5	80.3

* See Appendix Table X for fuller details. [a] Including Irish Free State. [b] Comparable figures not available.

cially important in the consideration of 1923–24, when ex-European imports were unprecedentedly large.

Great Britain. The United Kingdom has been aptly characterized as a "nation of week-enders" in the production of wheat. The metaphor turns on the fact that domestic production furnishes little over one-fifth of the national requirements of wheat, or only enough to maintain the population on their week-ends. As a consequence of the small domestic production and a high per capita consumption,[1] Great Britain is the most important wheat-importing country in the world, taking usually from 30 to 40 per cent of the wheat and flour entering into international trade.

The year 1923–24 in Great Britain was characterized by reduced crops, large wheat imports, exceptional flour exports, and the largest supplies of wheat since the war. Table 9 illustrates this recent situation, in comparison with the pre-war average and other post-war years.

TABLE 9.—WHEAT SUPPLIES OF GREAT BRITAIN AND IRELAND, PRE-WAR AND POST-WAR

(Million bushels)

Crop year ending July 31	Crop	Net imports	Available supplies
1909–14	59.6	217.7	277.3
1920–21	56.8	200.1	256.9
1921–22	73.8	208.2	282.0
1922–23	65.2[a]	211.9[b]	277.1
1923–24	58.5[a]	236.6[b]	295.1

[a] Including Irish Free State crops.

[b] Including imports into the Irish Free State of 6.4 million bushels from April 1 to July 31, 1923, and 16.3 million bushels for 1923-24.

British production of wheat, which was stimulated during the war years, has tended downward since the war. Much wheat acreage, plowed up during the war, has gone back to grass because, at prevailing prices for wheat, its cultivation has been unprofitable. Indeed, English farmers have latterly suffered from a depression hardly less acute than that experienced by United States farmers.[2] With reduced acreage and only moderate yields per acre, the British crop of 1923 was slightly under the pre-war average.

Net imports of wheat and flour in 1923–24, however, increased by an amount more than offsetting the reduction in crop. They were by far the largest since the war, and 25 million bushels higher than in 1922–23. Supplies available were 295 million bushels, about 18 million greater than the amount in 1922–23 or the pre-war average. Even so, British per capita wheat consumption remains below the pre-war level. If this was true at the low wheat prices prevailing in 1922–24, with business depression making for large consumption of cheap foods such as bread, the consumption is not likely to increase with higher levels of wheat prices. The change has taken place despite considerable unemployment. It is apparently attributable to increased consumption of meat and to a somewhat higher standard of living among large sections of the working classes, which permits the use of a larger variety of foods.

Great Britain has long been a leading flour importer, but a flour exporter to some extent as well. In 1923–24, as shown by Table 10, flour exports increased so greatly that the net imports were the smallest for many years. In large part this is explained by the fact that since April 1, 1923, the Irish Free State has been treated as a separate trade entity, so that heavy shipments to southern Ireland,[3] formerly inter-

TABLE 10.—BRITISH FLOUR TRADE, PRE-WAR AND POST-WAR*

(Thousand barrels)

Year ending July 31	Imports	Exports	Net imports
1909–14	6,123	930	5,193
1919–20	7,406	180	7,226
1920–21	8,127	1,575	6,552
1921–22	8,976	1,416	7,560
1922–23[a]	7,087	1,508	5,579
1923–24[a]	6,190	3,239	2,951

* Sources: *International Yearbook of Agricultural Statistics* and *International Crop Report and Agricultural Statistics.*

[a] From April 1, 1923, the data are for Great Britain and Northern Ireland only. Since the Irish Free State imports British flour, this fact accounts for much of the recent increase in exports and for part of the reduction in imports.

[1] According to estimates of the International Institute of Agriculture, the pre-war consumption of wheat in the United Kingdom was slightly less than 6 bushels per capita.

[2] See R. R. Enfield, *The Agricultural Crisis.* (London, 1924).

[3] Nearly half the total exports in recent months have gone to the Irish Free State.

nal trade, now count as exports. But it is also due in part to the development of the British milling industry and to heavier exports to Germany and other markets.

Smaller Countries Resembling Great Britain. Several small deficiency countries of Northern and Western Europe resemble Great Britain in producing less wheat than they import. They too show heavily increased net imports in 1923–24, by far the largest since the war, but these countries generally, unlike Great Britain, harvested larger crops than in 1922–23. Table 11 summarizes the crops, net imports, and available supplies for six of these countries,—Belgium, Holland, Switzerland, and the three Scandinavian nations. In the aggregate the 1923–24 supplies were 11 per cent higher than in 1922–23, the best previous post-war year, and somewhat higher than before the war.

TABLE 11.—WHEAT SUPPLIES OF SIX SMALLER DEFICIENCY COUNTRIES OF EUROPE, PRE-WAR AND POST-WAR*

(Million bushels)

Crop year ending July 31	Crop	Net imports	Available supplies
1909–14	38.2	107.2	145.4
1920–21	38.6	74.8	113.4
1921–22	51.1	86.5	137.6
1922–23	38.4	102.0	140.4
1923–24	44.3	111.8	156.1

* Belgium, Holland, Switzerland, Denmark, Norway, and Sweden.

In the case of Belgium, net imports for the past three years have averaged about 40 million bushels as compared with 50 million before the war, in spite of some reduction in domestic crops. The marked decrease in wheat consumption in Belgium is explained primarily by a higher standard of living among the working classes, leading to heavier consumption of meat, potatoes, and sugar. The Scandinavian countries, on the other hand, show marked increases in per capita wheat consumption since the war, largely at the expense of rye consumption.

Italy. The Italian wheat crop in 1923 was of record size—nearly 225 million bushels, over one-third larger than the crop of 1922. If imports had been correspondingly reduced, the total for 1923–24 would have been about 44 million bushels. The tendency for consumption to vary with the crop, however, is quite marked in Italy. As a result increased production seldom results in a corresponding decrease in imports, or decreased production in an equal increase in imports. Early estimates of probable imports evidently disregarded this fact, for they ranged from 37 to 56 million bushels.[1] It soon became clear that these estimates were all too low, and in January Broomhall increased his estimate to 72 million bushels. This was roughly equal to the final official figure of net imports for the year, 70 million bushels, but well below the gross imports, which amounted to about 78 millions.[2]

TABLE 12.—ITALIAN WHEAT CROPS, NET IMPORTS, AND SUPPLIES, PRE-WAR AND POST-WAR

(Million bushels)

Crop year ending July 31	Production	Net imports	Available supplies
1909–14	183.3	53.0	236.3
1920–21	141.3	99.4	240.7
1921–22	194.1	100.5	294.6
1922–23	161.6	115.7	277.3
1923–24	224.8	69.8	294.6

As shown in Table 12, the Italian wheat supplies for domestic consumption were nearly 295 million bushels, practically the same as in 1921–22 but 17 million bushels larger than in 1922–23. The actual variation in consumption was probably smaller, if account is taken of carryovers and of the tendency to overestimate crops in good years and to underestimate them in bad years.

In the past three years Italian wheat consumption has been roughly 22 per cent higher than before the war. Much of this increase results from a considerable increase of population (amounting to some 15 per cent), caused, in its turn, by the addition of territory, the reflux of emigrants during the war, the lower rate of emigration during and since the war, and the natural increase of population. Clearly,

[1] *Foreign Crops and Markets*, Dec. 12, 1923, p. 484; Broomhall's *Corn Trade News*, Oct. 30, 1923.

[2] Broomhall's estimate was expressed in round numbers, as 9 million quarters.

however, there has been a notable increase in per capita consumption of both wheat and meat at the expense of corn and rice. In part this is undoubtedly attributable to the good Italian crops and the low level of wheat prices in the past three years, causes temporary in character. In 1923–24 the prevalence of industrial prosperity in Italy was another factor. But the change is also due in part to a trend, strengthened by war experiences and favored by present national policies, toward a more varied diet for the masses.

The value of wheat in relation to other commodities was extremely low in Italy in 1923–24, probably lower than in any other large wheat-producing country except Germany, particularly in the early months of the crop year. This is clearly shown by the following monthly index numbers of the Milan price of home-grown soft wheat, on a 1913 base, reduced by a Milan wholesale price index number:[1]

Aug.	61.3	Dec.	61.6	Apr.	73.0
Sept.	61.0	Jan.	64.6	May	73.5
Oct.	61.1	Feb.	67.4	June	74.1
Nov.	60.5	Mar.	73.2	July	69.8

Consequently there was considerable agitation for the reimposition of the import duty on wheat, which had been suspended since 1915. This agitation, however, was unsuccessful, and the suspension of the duty was continued. In January and February, however, prices of domestic wheat rose sharply, by some 20 per cent, largely, it would seem, as a result of a premature approach to exhaustion of domestic supplies.

[1] See also Appendix Table XVIII and above, p. 3.

[2] The official figures for exports during the past two years are as follows, in metric tons:

	1922–23	1923–24
Wheat flour	36,283	135,606
Semolina	888	2,579
Wheat pastes	14,950	18,278
Total	52,121	156,463

See also Appendix Table XI.

[3] "The exportation of semolina and wheat flour was limited to 100,000 quintals per month by an order approved by the council of ministers on August 6, 1924." *Commerce Reports,* Sept. 15, 1924, p. 684. The average monthly export of wheat flour and semolina in 1923-24 was 115 thousand quintals, but in several months it was much larger.

[4] Effective Sept. 18, 1924. *Commerce Reports,* Oct. 6, 1924, p. 53.

As a result of the large crop and low prices in Italy and conditions favorable to importing wheat to manufacture for export, the flour-milling and alimentary-paste industries in Italy prospered greatly in 1923-24. Flour exports rose to the record figure of 136 thousand tons, nearly double the prewar average and nearly four times the corresponding exports in 1922–23. Exports of semolina and wheat pastes also expanded greatly.[2] The economic revival of the smaller states of southeastern Europe, and improved commercial relations, contributed to furnish Italy a large export market for her wheat products, in part, however, at the expense of Budapest. Table 13, giving the destinations of Italian wheat flour exports for the past two crop years, indicates the general expansion and the heavy movement, especially to Austria, Switzerland, Jugo-Slavia, and Italian dependencies.

TABLE 13.—DESTINATIONS OF ITALIAN EXPORTS OF WHEAT FLOUR, 1922–24*

(Metric tons)

Destination	1922-23	1923-24
Austria	8,981	39,992
Czecho-Slovakia	.....	7,132
Switzerland	3,543	11,680
Fiume	3,924	2,926
Jugo-Slavia	8,028	20,331
Tripoli and Cyrenaica	5,273	19,740
Greece	2,111	11,077
Great Britain and Ireland	539	9,938
Other Countries	3,884	12,791
Total	36,283	135,606

* Source: *Ufficio Centrale di Statistica del Commercio Speciale di Importazione e di Esportazione.*

The growth of the Italian export trade in wheat flour is not likely to continue in 1924-25. The crop of 1924 was distinctly smaller than that of 1923, and measures have been taken to restrict the exportation of wheat flour and semolina.[3] Furthermore, the import duty on wheat flour has been reduced from 1.50 gold lire to 0.65 gold lire per quintal, and on semolina from 3.50 gold lire to 1.50 per quintal.[4]

France. Before the war France was nearly self-sufficing in wheat, importing only about 12 per cent of her supplies. The reattainment of substantial self-sufficiency in wheat, with the aid of French

colonies in North Africa, is an accepted national policy.[1] By promoting research in seed selection, wheat cultivation, milling and baking quality, transportation and merchandising of grain, by facilitating fertilizer consumption, by tariff duties on wheat, and by extensive propaganda, successive governments have undertaken to accelerate the attainment of this ideal.[2] Nevertheless in 1923–24, after a good wheat crop, the net imports, some 53 million bushels, were about 16 per cent of the total supply.

French wheat acreage, though it has tended upward since the war, is still some 15 per cent below the pre-war level, despite the addition of Alsace-Lorraine acreage. This deficiency is due only in small part to the devastation of the North of France, for the agriculture of that region is pretty well restored. It is due more largely to preference for animal husbandry and to the shortage and high price of farm labor, resulting chiefly from the heavy war casualties, from the attractiveness of industrial employment and town life, and from the low level of living conditions for rural laborers. The low prices of wheat have no doubt been a contributing factor. The work of reconstruction and the increased industrialization of France have been partly at the expense of agriculture. Thus, while yields per acre since the war have been rather above than below pre-war levels, total production has been much below.

In view of the financial difficulties involved in importing wheat, the Government has taken various measures to restrict wheat consumption. Thus when the harvest of 1922 proved disappointing, the Government established a regulation requiring the maximum extraction from wheat of flour suitable for baking. The average rate of extraction since then has been estimated at 75 to 80 per cent, as compared with about 70 per cent in the United States. Moreover, the addition of substitute cereals in the manufacture of flour was prescribed, and by the close of 1922 the addition of 10 per cent of rye was made compulsory. On July 12, 1923, these regulations were extended to August 31, 1924, barley and cassava being added to the list of possible substitutes and the percentage of substitutes reduced from 10 to 8. Although these regulations[3] have undoubtedly been enforced but poorly, they have unquestionably kept down domestic consumption. The "saving" has been liberally estimated at 25 to 32 million bushels for the year 1922–23. For 1923–24 the corresponding figures, not yet available, may be higher still, considering that the regulations were in force throughout the year. The turnover tax, which affects wheat at various stages between grower or importer and consumer, is also charged with some influence in restricting consumption.

The crop of 1923 was admittedly overestimated. The early official estimate was 291 million bushels. This was reduced in June 1924 to 276 million. In August 1923 it was officially asserted that France would need no wheat imports except those from North Africa. Broomhall estimated that 17 or 18 million bushels would probably be imported during the year for blending purposes and for milling in bond.[4] In the first five months, however, imports exceeded 23 million bushels, of which only 8½ million came from North Africa. In January, February, and March, imports were somewhat checked by the heavy depreciation of the franc, despite the reduction in the tariff on January 7; but in the last four months of the crop year they were again heavy. For the whole year, the net imports reached 53 million bushels, a higher figure than in 1922–23, when the crop was unquestionably smaller.

Table 14 (p. 16), utilizing official figures for crops and net imports,[5] shows the avail-

[1] Some enthusiasts, among them a recent minister of agriculture, have even advocated making France a net exporter of wheat. Provided yields can be economically increased by improved methods of cultivation, such a goal is not impossible of attainment; but it seems at present a remote possibility.

[2] See the Reports of the Semaine Nationale du Blé.

[3] See especially L. Machafel in *Almanach du Blé pour 1924* and Joseph Bernin, *Rapport . . . au Chambre des Deputes,* No.7331, Douzieme Legislature, 1924, p.67.

[4] *Corn Trade News,* Aug. 28, 1923.

[5] Unofficial estimates of French wheat crops, by Association de la Meunerie, *Bulletin des Halles,* and M. Sicot, show results differing considerably from the official figures. The pre-war crops seem to have been underestimated. There is some reason to believe that net imports in 1923-24 were smaller than those shown, because of unrecorded flour exports to occupied and unoccupied Germany.

able supplies in recent years as compared with the pre-war average. Disregarding carryovers, which account for part of the variations shown, it appears that French gross consumption in the past year has been about 9 per cent below the pre-war level, for a population of about the same size.

TABLE 14.—FRENCH WHEAT CROPS, NET IMPORTS, AND SUPPLIES, PRE-WAR AND POST-WAR

(Million bushels)

Crop year ending July 31	Production	Net imports	Available supplies
1909–14	317.6	43.6	361.2
1920–21	236.9	68.3	305.2
1921–22	323.5	17.1	340.6
1922–23	243.3	45.6	288.9
1923–24	275.6	53.0	328.6

In France, as in Belgium, the reduction in per capita wheat consumption is due in part to an improvement in the diet of the masses, accompanying an increase in the standard of living. In view of policies tending to restrict domestic consumption, it is unlikely that imports in the coming years will be made to the extent necessary to restore gross consumption to the pre-war level. This restoration, if it comes, is likely to await the increase of acreage and domestic crops.

Germany. Germany stands apart from the other large countries of western Europe on account of the prominence of rye and potatoes in the national dietary. According to the report of the Eltzbacher Commission, over 45 per cent of the calories in the pre-war German diet was supplied by rye, wheat, and potatoes; and of the amount thus supplied, rye contributed 40 per cent, wheat 35 per cent, and potatoes 25 per cent. The consumption of wheat was heaviest in the cities, that of rye and potatoes heaviest in the country districts. Since only 25 or 30 per cent of the potato crop was customarily used for food in an average year, additional substitution of potatoes for bread grains in a particular year was a ready adaptation. There was more feeding of bread grains to domesticated animals in Germany than in the other large European countries; normally, 10 per cent of the wheat and 25 per cent of the rye, after subtraction of seed, was thus utilized.

Prior to 1914 Germany was second only to Great Britain in the magnitude of imports of wheat. Since the war, however, German imports have been less prominent. In 1920–21, with a wheat crop estimated at 82 million bushels—only a little more than half as large as the average pre-war crop, Germany was the third largest importer. In 1921–22, when the crop had improved by 25 million bushels, she fell to fourth place. In 1922–23 the crop was officially estimated at only 72 million bushels, and a considerable increase in German imports was anticipated. Instead, imports declined until Germany stood fifth among importing countries.

It is generally admitted that German consumption of wheat and other bread grains was notably reduced in 1922–23. In the fall of 1923 Broomhall fairly described the German wheat and rye situation in the following words:

> In 1921–22 the quantity of these bread-cereals used for all purposes amounted to 53.7 million quarters, whereas in the following season it dropped to 43. Part of this difference may be due to underestimation of the 1922 crops and variations in end-of-season stocks, but it is evident that there has been a tendency towards reduced consumption, owing to the financial difficulty of importing foreign grain. With much better production this year, it remains to be seen whether consumption will be increased or whether the country will continue on short rations and so make itself practically independent of foreign supplies.[1]

With the accelerating depreciation of the mark during August, September, and October, 1923, farmers and other holders of grain refused to sell. As a result consumption for the nation as a whole declined, and the food situation in the cities became acute. This condition was not materially relieved by the announcement of the Ministry of Food in August 1923 that bread grains sufficient to last until October were in the possession of the Government.[2] Widespread unemployment and low wages considerably reduced the purchasing power of the industrial population. The situation

[1] Broomhall's *Corn Trade News*, Sept. 17, 1923.

[2] *Ibid.*, Aug. 14, 1923. These holdings are said to have amounted to 920,000 tons as of August 15, 1923.

continued to be so grave that in December the German Government requested the permission of the Reparation Commission to borrow 70 million dollars, which American interests were willing to lend if priority over reparations were given. The credits thus secured were to be used in financing imports of foodstuffs, on the assumption that the food crisis was the result of inability to secure supplies from abroad. While the crisis was developing and the request was being considered, the rentenmark currency became established, and before final action on the request was taken by the Commission, this phase of the crisis had largely disappeared.[1] With improvement in the currency, domestic grain appeared on the market in surprising amounts. During the winter and spring, unemployment declined, wheat prices fell, and it is safe to assume that at length a considerable increase occurred in the consumption of bread grains.

In the first half of the crop year German imports of wheat averaged about 2 million bushels a month, according to the official figures. In the last half of the year the monthly average was about 3 million bushels. Imports of wheat and rye flour increased relative to imports of wheat and rye as grain.

In order to compare the post-war bread grain consumption with that of the pre-war period, it is necessary to apply a correction to the pre-war crop estimates. It has been officially recognized in Germany that the reported pre-war estimates of wheat and rye were exaggerated and post-war estimates set too low. Accepting corrections computed by Dr. Kurt Ritter,[2] Table 15 shows a comparison of bread grain supplies in pre-war and post-war years ending July 31, combining net imports with crops.

[1] J. S. Davis, "Economic and Financial Progress in Europe, 1923-24," *Review of Economic Statistics*, July 1924, p. 210.

[2] "Die Landwirtschaftstatistik und die Landwirtschaft," in *Deutsche Tageszeitung*, Jan. 12, 1924.

WHEAT, RYE, AND SPELT *(million bushels)*

Year	Official estimates	Ritter's estimates	Percentage error
1911	563	507	+11.1
1912	601	496	+21.1
1913	636	541	+17.6
1920	272	340	−20.0
1921	365	420	−13.0
1922	268	309	−13.0
1923	373	411	−9.1

TABLE 15.—GERMAN BREAD GRAIN SUPPLIES, 1911–14, 1920–24

(Million pounds)

Crop Year	Wheat	Rye	Total	Pounds per capita
1911–12	11,606	20,071	31,677	481
1912–13	12,105	19,146	31,251	470
1913–14	12,764	21,000	33,764	501
1920–21	9,776	14,922	24,698	408
1921–22	11,607	17,580	29,187	476
1922–23	7,199	15,676	22,875	369
1923–24	8,772	17,418	26,190	417

There is reason to believe that the figures for imports err in the direction of understatement, particularly those for 1921–22 and 1922–23. The import figures do not include the occupied areas or the Saar; and the Ruhr occupation, extending from January 1923 to September 1924, greatly increased the population in occupied zones. This territory is of considerable importance for both milling and consumption. Usually the major portion of German bread grain imports enter through the Western provinces. It is impossible to obtain any precise estimate of the quantity of wheat that entered Germany through the occupied territory. A comparison of the German official figures of imports of wheat flour from the Netherlands with the Dutch figures of exports to Germany, indicates that this movement must have been considerable. The Dutch records of wheat flour exports to Germany for the first eleven months of the crop year show 415 thousand barrels (equivalent to nearly 2 million bushels of wheat) more than the German records of imports from the Netherlands. If the figures for both wheat and wheat flour from all other sources could be compared in the same way, an appreciably higher estimate of domestic disappearance would undoubtedly be secured. The figures for supply are, therefore, minimal figures.

There is evidence that in Germany less than the normal amount of wheat and rye has been fed to domesticated animals; also that the extraction in milling has been higher than in pre-war days. This would mean that the flour supply has been larger

than would be indicated by the supply of bread grains. How much larger, however, it is impossible to suggest. The figures clearly indicate that the bread-grain supply of the country during the past year was below the normal per capita level. To what extent this was borne by the human population and to what extent by domesticated animals, is not determinable.

If these data are trustworthy, we must conclude that wheat consumption was lower in 1923–24 than in 1920–21 and 1921–22, but considerably higher than in 1922–23; and that rye consumption was lower in 1923–24 than in 1921–22, but considerably higher than in 1920–21 and 1922–23. The total bread grain supply was highest in 1921–22, followed by 1923–24, then 1920–21, with 1922–23 notably the lowest. The figure for 1922–23 would seem to be fictitiously low, for reasons affecting wheat rather than rye.

In view of the price situation in 1923–24 it is surprising that German consumption of wheat was not larger. When wheat prices are corrected for the general price level, their values, on a percentage basis, for the last three crop years are 105, 100, and 64.[1] With similarly low wheat values, other continental countries imported much more heavily. A comparison of wheat and rye prices is also informing. For equal quantities of the two cereals, rye cost 76, 77, and 84 per cent of the price of wheat in the three crop years ending with 1923–24. In other words wheat was relatively cheaper, in terms of rye, in 1923–24 than in the two preceding crop years. That Germany has imported wheat when cheaper rye was equally available is an illustration of the power of taste over price. That imports were not larger seems, for the most part, to have been a result of the extremely unfortunate financial conditions in the first few months of the crop year, which affected both imports and consumption, and of the low income of the masses of the population in the year as a whole.

The potato crop of 1923 was of fair size, considerably above the average of the post-war years, though much below the huge crop of 1922. The marketing of the crop, however, suffered from the disorganization of transport, occasioned by the occupation of the Ruhr. Nevertheless, the supply of potatoes was sufficiently large to make them available as a substitute for bread grains to a greater extent than was the case in 1920–21 and 1921–22, though less than in 1922–23. Table 16 presents the figures for apparent supplies of wheat, total bread grains, and potatoes during the past three seasons. Obviously, the adaptation lay in the supply of potatoes.

TABLE 16.—GERMAN SUPPLIES OF WHEAT, BREAD GRAINS, AND POTATOES, 1921–24

(Million metric tons)

Crop year	Wheat	Bread grain	Potatoes
1921–22	5.3	13.2	26.2
1922–23	3.3	10.4	40.7
1923–24	4.0	11.9	30.4

China and Japan. One of the most striking features of the year 1923–24 was the extraordinary purchasing of wheat and flour by ex-European countries. Although this broad fact is unmistakable, it is impossible to give it quantitative expression. The diversity of opinion regarding the total of ex-European imports becomes quite evident upon an examination of the statistics of movement. Broomhall estimates ex-European takings at 149 million bushels, Sir James Wilson at 192. Compilations from official figures indicate ex-European takings of from 225 to 250 million bushels.[2]

Despite these differences as to the amount purchased by ex-European importers, there is unanimity on the conclusion that it surpassed all preceding records. Broomhall and Sir James Wilson agree that it was about 56 million bushels greater than in 1922–23. Broomhall considers it 67 million bushels above the average from 1909–10 to 1913–14.

Part of this ex-European movement of

[1] See above, Table 2.

[2] Broomhall gives total movement as 775 million bushels. Official figures indicate that it was nearer 800. Broomhall estimates European imports at 626; official figures show net European imports of about 527. Since Broomhall's chief sources are the exporting ports it may be assumed that some diversion to ex-European destinations occurred without being reflected in his estimates. His figures include shipments from the Danube area and do not take account of exports of European flour to ex-European markets.

wheat and flour consists of small quantities sent to widely scattered markets; but the most important current is that which flows to the second greatest low-pressure area, China and Japan. Japan alone imported 80 million bushels of wheat and flour in 1923–24, more than twice as much as her domestic production, as compared with 14½ millions in 1922–23, and with slightly over 4 millions, on the average, in the five years before the war. The imports of China are not definitely known. It may safely be assumed, however, that these two Oriental countries were the recipients of fully half of the ex-European shipments.

This increase in Oriental imports was especially important to Australia and the Pacific coasts of the United States and Canada. Combined with the unusually large surplus in the Pacific Northwest and the relatively small surplus east of the Rocky Mountains, this resulted in a considerable increase in the proportion of United States exports that found an outlet through the Pacific ports.[1]

These unusually heavy purchases by ex-European countries were not anticipated at the beginning of the crop-year 1923–24. During the year Broomhall increased his estimates of ex-European imports from 100 million bushels to 148 million bushels, while Sir James Wilson increased his from 152 million bushels to 192 million bushels.

The large importations by Oriental countries may be explained in part by the growing demand for wheat in China and Japan. The immediate causes of the increase, however, are to be found in crop conditions and the price situation. In 1923 China experienced her third successive crop failure,—two years of drought and one of floods. It is impossible to secure any quantitative expression of the extent of these disasters, since opinions as to the average production in China vary from 200 to 600 million bushels. Practically all authorities agree, however, that the Chinese wheat crop in 1923 was decidedly below normal.

In Japan the production was not much below normal; but there was little prospect of the usual imports from Manchuria because of the poor crops there, and rice supplies, in Japan and her foreign sources of supply, were smaller than usual. In the fall of 1923 the import duty of about 22 cents per bushel was suspended until March 31, 1924,[2] in consequence of conditions occasioned by the earthquake of September 1.

The low level of wheat prices in 1923–24 was clearly responsible for much of the increased purchases of wheat and flour by buyers in China and Japan. The tendency of Oriental imports to increase with low prices has often been noticed.[3] This tendency is perhaps accentuated by the fact that the Oriental is by temperament a gambler. When the price seems low, importers purchase with little regard to current needs. The result is a buying orgy such as American Pacific Coast markets experienced in the fall of 1923. The natural result was an excessive accumulation of stocks in the Oriental market. This condition became acute in May 1924, and was accompanied not only by a slackened demand, but by efforts to cancel orders. In the late summer of 1924 it was reported that stocks had piled up in Oriental markets until it was possible to purchase wheat cheaper in Shanghai than in America.[4] Consequently, the prospect is that, despite poor harvests in 1924, Oriental imports of wheat in the coming crop year will be very much less than in 1923–24, particularly at current prices.

In short, almost every European country except Germany imported wheat heavily in 1923–24, in spite of large crops, so that in most deficiency countries wheat supplies

[1] As shown by the following tabulation of United States wheat and flour exports by customs districts, in percentages of each year's total. From *Foreign Crops and Markets*, Aug. 6, 1924.

District	1921	1922	1923	1924
Canadian and Lake Ports	3.4	11.4	14.7	11.7
Atlantic Coast Ports	36.7	28.7	38.3	26.3
Gulf Coast Ports	47.9	36.9	28.7	19.9
Mexican Border Ports	.3	.5	.5	1.6
Pacific Coast Ports	11.7	22.5	17.8	40.5

[2] Broomhall's *Corn Trade News*, Oct. 2, 1924. Imports were especially heavy in February and March.

[3] Cf. A. Berglund, "The Wheat Situation in Washington," *Political Science Quarterly*, September 1909, XXIV, 489; John B. Watkins, *The Development of the Export Market for Wheat and Flour of the Pacific Northwest*, MS. Thesis, University of Chicago, August 1924, p. 89.

[4] *Corn Trade News*, May 30, 1924, Aug. 6, 1924. Imports in May and June were only about 1½ million bushels.

were by far the largest since the war, while the Oriental countries absorbed unexpected amounts, of which a considerable part was carried over into the new year. As compared with pre-war days, per capita supplies were appreciably smaller in Great Britain, Belgium, and France, because of changes in dietary habits, supplemented in France by public measures to restrict consumption, while in Germany an even greater reduction in per capita supplies was brought about by peculiarly unfavorable economic conditions. In Norway, Sweden, Italy, and Japan, on the other hand, per capita supplies were larger than before the war, because of other changes in dietary habits. The major factor making for large imports in 1923–24 was the availability of abundant supplies at low prices.

VI. DEVELOPMENTS IN SURPLUS-PRODUCINIG COUNTRIES

The wheat requirements of the deficiency countries, beyond their domestic crops, are met largely by exports from overseas sources, notably the United States, Canada, Argentina, and Australia. Secondary sources of international wheat supplies are Russia, the countries of the lower Danube basin, North Africa, and British India; all of these except North Africa were far less important in 1923–24, notwithstanding good crops, than before the war. Wheat imports are supplemented, to a degree more or less important, by rye exports from North America and normally, as in pre-war years and in 1923–24, from Russia.

The relative importance of the exporting countries is indicated by Table 17, showing net exports of leading exporters before and since the war. The impressive features are the predominating importance of the four major sources of supply, the rise of Canada, Argentina, and Australia as wheat exporters, the declining importance of the United States since 1918–20, and the reappearance of exports from Russia, the Danube area, and British India, now as minor exporters.

In the United States, where exports regularly are far less than domestic consumption, and where the exports of 1923–24, while of large absolute importance, were relatively small, the situation was peculiar in several respects and is reserved for discussion in the next subsequent section. In this section the significant developments in other surplus-producing countries can be summarized, with particular reference to the export situation.

Table 17.—Net Exports of Wheat (Including Flour) by Leading Exporters, Pre-War and Post-War Years Ending July 31 *

(Million bushels)

Country	1909-14	1921-22	1922-23	1923-24
United States	110	251	200	127
Canada	96	187	281	348
Argentina	85	118	139	172
Australia	55	115	50	86
British India	50	(14)[a]	29	20
Russia[d]	165	(5)[a]	2	23
Danube basin	109[b]	21	8[c]	25[c]
Algeria and Tunis	4½	5½	3	10
Total	675	679	712	811

* See Appendix Table X.
[a] Net imports.
[b] Excluding Serbia.
[c] Excluding Bulgaria.
[d] Figures for Russia from *Foreign Crops and Markets.*

Canada. The Canadian crop of 1923 was the largest ever harvested, with a total production of 474 million bushels, compared with 400 million bushels in 1922 and an average of 236 million bushels for the five years 1917–21. The population of Canada is relatively small; consequently the amount of wheat used in Canada for human consumption, though large per head of population, is only a small part of the crop. Since the wheat belt is in the main a one-crop region, with little diversified farming, particularly in the newer areas of the North and West, feeding is not a practicable outlet for any large portion of the surplus. Moreover, farmers find it necessary to turn the wheat into money, since in much of the wheat-growing area it is the only source of money income. As a result, the great bulk of the Canadian crop must be marketed abroad, and in 1923 the exceptional size of the crop created a huge export problem.

The season of 1923 was late, and the delay in harvesting, complicated by a strike affecting transportation, postponed the shipment of a considerable portion of the

crop until navigation on the Great Lakes and the St. Lawrence River had opened in the spring, when Canadian wheat encountered the competition of the new crop of the Southern Hemisphere. Moreover, the crop, though of high protein-content, was below average in weight per bushel.[1]

In spite of these internal difficulties, and the generally heavy production throughout the world, the predominating feature of the year in Canada was the immense export, the total movement being the greatest ever reported by a single nation. The high milling quality of Canadian hard spring wheat, which makes up the bulk of the crop, had brought it into general favor throughout the world, thus greatly simplifying the marketing of the increased 1923 supply. Not only has the wheat been in great demand abroad, but flour-milling for export has also increased rapidly, the shipments from Canada having very nearly doubled between the crop years 1920–21 and 1923–24. While the use of wheat for feed was high, though not as high as in 1922–23, when it slightly exceeded domestic food consumption, a tabulation of the disposition of the crop for the last four years shows that the increase in the crop of 1923 over that of 1922 was largely taken care of by increased exports.[2]

The supply of grain retained within the country was only slightly larger than in 1922–23. When the stocks remaining on August 31, 1924, are deducted it is apparent that the disappearance of wheat and flour within the country was smaller during 1923–24 than in the preceding season, in spite of the increased size of the crop, and more nearly approached the quantity used for consumption in 1920–21 and 1921–22, when the crops were much smaller. It is evident that, even under somewhat unfavorable conditions during the past year, the marketing facilities of Canada were adjusted to the handling of larger crops than Canada formerly produced. The development of terminal and shipping facilities at the port of Vancouver, through which grain can be shipped from the western provinces the year round, has proceeded apace. A considerable portion of the 1923 crop was shipped out in the spring, despite the competition of large crops in the Southern Hemisphere. These achievements have an important bearing upon the distribution of future large crops in Canada.

TABLE 18.—CANADIAN WHEAT SUPPLIES AND THEIR DISPOSITION, CROP YEARS ENDING AUGUST 31, 1920–24

(Million bushels)

	1920-21	1921-22	1922-23	1923-24
Available supplies	273.6	309.0	416.2	483.5
Exports, wheat and flour	167.2	194.1	279.5	343.2
Domestic use	98.6	98.9	127.8	113.8
Stocks, August 31	7.9	16.0	8.9	26.5

The total value of the Canadian crop of 1923 was less than that of 1922,[3] notwithstanding its increased size. In Saskatchewan and Alberta, the largest producing areas, on the other hand, the crop was not altogether unremunerative, because high yields per acre reduced costs per bushel. This is indicated by a comparison of farm prices with costs of production per bushel for the crop of 1923 in the Prairie Provinces, furnished in a study made by the Dominion Bureau of Statistics.[4] On this showing, Alberta farmers slightly more than covered their total costs, while Saskatchewan farmers covered all but part of their land charges. It must be pointed out that these figures are averages of returns from individual crop correspondents, and that the costs of many farmers may be more and those of other farmers less than

[1] The average weight per bushel, a partial index of quality, was low in 1923, as the following figures show:

1913-22 average	59.28 lbs.
1922 "	60.24 "
1923 "	58.80 "

Monthly Bulletin of Agricultural Statistics, January 1924, p. 29.

[2] See Appendix Table VII *(B)* for greater detail.

[3] Farm values compare as follows: 1922—$339,419,000; 1923—$316,934,700. *Monthly Bulletin of Agricultural Statistics,* January 1924, p. 4.

[4] Farmers in Manitoba, where the yield was not heavy, lost considerably. *Monthly Bulletin of Agricultural Statistics,* January 1924, pp. 19-24; June 1924, p. 184.

Province	Production *mil. bus.*	Cost of production After stubble	Cost of production After summer fallow	Average farm price
Manitoba	32.8	$1.00	$1.04	$0.67
Saskatchewan	252.6	0.75	0.73	0.65
Alberta	166.8	0.63	0.62	0.65
Prairie Provs.	452.3	0.72	0.71	0.66

the averages. Naturally, also, the price received by farmers depended greatly upon the time when the crop was sold, as an examination of wheat prices at Winnipeg will show.[1] Nevertheless, the comparison suggests that the new lands in the western Prairie Provinces can raise wheat profitably under all but extremely unfavorable conditions of the world market.[2]

The carryover on September 1, 1924, was unusually large, partly because of the difficulty of marketing the large crop, but more because of unfavorable reports during the summer of 1924 concerning the new crop. The stocks were accumulated in elevators and mills, in the main, although the amount left in farmers' hands increased to some extent.[3] The new crop is at present estimated at only 272 million bushels,[4] which makes the large carryover of some significance in the Canadian supply for 1924–25.

Argentina. The wheat crop of the Southern Hemisphere is harvested in December and January. As a result, the old crop is still drawn upon for consumption and export during the fall months. During the early part of the crop year 1923–24, exports were large because of favorable reports of the new crops. These reports were influenced not only by favorable weather, but also by the fact that the acreage planted to wheat was more than a million acres greater than in the preceding year, an expansion due largely to poor conditions in the cattle industry. As a result of active exporting, by the first of January 1924 the stock of wheat on hand in Argentina was nearly exhausted.

The new crop turned out as well as had been expected. The estimate in January was 259 million bushels, later reduced by 12 million bushels. Domestic consumption was approximately the same as in the preceding year, since the population of Argentina is small and the export market is the primary outlet for their wheat crops. Feeding of wheat was moderate, particularly since the corn crop was large. As a result, exports during the spring of 1924 were very heavy, so that the shipments from January through July reached nearly 140 million bushels, practically as much as the total exports in the preceding year. A summary of Argentine wheat supplies and their disposition in the past three years is shown in Table 19.[5]

Table 19.—Argentine Wheat Supplies and Their Disposition, Crop Years Ending December 31, 1922–24

(Million bushels)

	1922	1923	1924
Available supplies	220.4	206.5	247.6
Exports	145.5	140.2	139.0[a]
Domestic use	64.2	65.7	65.6
Stocks, Dec. 31	10.7	0.6	....

[a] Exports of first seven months.

The outward movement consisted mainly of wheat, although flour exports were greater than for several years past.[6] Exports were somewhat facilitated by the reduction of the export duty by approximately 2 cents per bushel in February, and by its removal, in April, for the remainder of the crop year 1923–24.[7] The cost of producing wheat in Argentina is probably lower than in any other exporting country because of low labor costs and the low value of land. There is reason to believe that, despite low wheat prices, profits were realized to a greater extent than in any other wheat-exporting nation, as a result of the large crop and the low cost of production.

Australia. Weather conditions were not favorable during the fall of 1923 in Australia, and it was expected the harvest would be no greater than in 1922–23. Early in November, however, there was rain throughout most of the country, and crop prospects improved greatly. The harvest turned out to be considerably larger than in the preceding year, although not a bumper crop. Exports were not large during the fall, because of the prospect of a short crop, and when receipts of new wheat began to come in the stock on hand was large.

Domestic consumption of wheat and

[1] See Appendix Table XVII.

[2] Unfortunately the technique of farm cost of production studies is still too imperfect to afford a thoroughly safe basis for such statements.

[3] See Appendix Table XVI.

[4] November 1 official estimate.

[5] See also Appendix Table VII (*C*).

[6] See Appendix Table XI (*A*).

[7] This was due not to new legislation, but to the operation of the existing law which provides a sliding scale of export duties.

flour in Australia has increased in late years but is still small in comparison with the crop. Requirements for seed and feed have not increased to any large extent, and the total supply from the harvest of January 1924 destined for home use was not much greater than in the previous year.

TABLE 20.—AUSTRALIAN WHEAT SUPPLIES AND THEIR DISPOSITION, CROP YEARS ENDING DEC. 31, 1922–24

(Million bushels)

	1922	1923	1924
Available supplies	136.1	115.3	135.5
Exports	84.5	62.2	64.5[a]
Domestic use	45.6	43.1	43.9
Stocks, Dec. 31	6.0	10.0	....

[a] First seven months.

Accordingly, the carryover plus the supply from the new crop made a large exportable surplus, which was shipped out rapidly in the spring. While autumn estimates of exports during 1923–24 were from 56 to 64 million bushels,[1] actual shipments for the year were 86 million bushels, notwithstanding the light export during the fall months. Shipping was relatively easy to secure, and the Orient afforded an adjacent market for large quantities of both wheat and flour. The flour exports alone exceeded 5 million barrels, 30 per cent larger than in 1922–23, and nearly three times the pre-war average.[2]

The Danube Basin. The countries of the lower Danube basin—Hungary, Roumania, Bulgaria, and Jugo-Slavia—had good crops in 1923–24, and had the largest exports of wheat and flour since the war. Table 21 shows that the production of these four countries was nearly 40 million bushels greater than in 1922 and that exports were also much greater, increasing from 8 million bushels in 1922–23 to nearly 25 million bushels in 1923–24, and exceeding the 1921–22 exports of 21 million bushels. Both production and exports, however, were small as compared with pre-war years.

The domestic utilization of wheat in these nations was more than 20 million bushels greater than in the preceding year. This was to be expected in view of the increase in crops. Another important factor was that currency fluctations made the peasants reluctant to sell their grain except as it was necessary to meet financial obligations. Governmental restrictions of wheat exports, coupled with the fluctuations in the currencies and exchange rates, made wheat-trading a hazardous and speculative undertaking throughout much of the year, with the result that exports from these nations were curtailed to some extent.

TABLE 21.—WHEAT PRODUCTION AND EXPORTS OF COUNTRIES IN THE DANUBE BASIN, 1922–24

(Million bushels)

	1922-23		1923-24	
	Production	Exports	Production	Exports
Roumania	92.0	1.6	101.0	2.5
Bulgaria	37.7	[a]	36.2	[a]
Hungary	54.7	5.2	67.7	16.8
Jugo-Slavia	44.5	1.0	61.1	5.2
Total	228.9	7.8[b]	266.0	24.5[b]

[a] Figures not available. [b] Excluding Bulgaria.

Exports of wheat and flour from Rumania were prohibited throughout the early fall, and the prohibition was replaced in November by a very high export tax. Transportation was slow and uncertain; and the Danube was frozen over for a longer period than usual, greatly hindering the export during the winter months. The largest shipments were made by rail to Austria and Czecho-Slovakia. Later in the crop year the duties were lowered somewhat, when it was seen that the grain on hand was more than sufficient to last until the new harvest.

A somewhat similar situation prevailed in Hungary, although there exports were much larger. The Government kept close control of the wheat and flour trade during the fall, and numerous restrictions made business slow. In January the millers succeeded in raising a loan of £750,000 for the government, chiefly in London, and in return the decrees hindering export were withdrawn. Prices of wheat remained high, however, because of the refusal of the peasants to sell their wheat except as necessity arose, and the position of millers became

[1] Broomhall's *Corn Trade News,* Aug. 14, Oct. 16, and Dec. 4, 1923.

[2] See Appendix Table XI *(A)*.

even more difficult when in March the Czecho-Slovakian government prohibited further import of Hungarian flour, as the quota of flour imports from Hungary which they had fixed upon had been filled.[1] In spite of this, export conditions gradually improved, and in May the export duties on flour were abolished and the wheat export tax was reduced to 5 per cent. The differential in favor of flour was due to the desire of the government to protect the milling industry, which has been severely injured by territorial changes affecting both the securing of grain and the export of flour, so that the capacity of the mills within the country is several times the quantity required for domestic consumption.

The crops of Jugo-Slavia were large, but exports were not as great as anticipated. The difficulty of securing supplies from the farmers at a price low enough to make profitable sales in the international market, and Italian competition in the flour trade in Adriatic ports, were the principal causes for the small export. Bulgarian exports were restricted by a high duty, although this was reduced between December and April, during which time practically all the surplus grain was exported.

The wheat industry of the lower Danube area continues to suffer from the results of the war and post-war changes. The growing and the marketing of wheat are less efficient than previously, largely because of the subdivision of large holdings. The large landowner tended to exploit labor and tenants in order to secure exportable grain. The small peasant endeavors, through diversification, to approximate a self-sufficient household. The standard of living has risen, which means relatively less export. Finally, the quality of wheat seems to have deteriorated during the war, and this has continued in the direction of lower protein-content and decreased hardness. The milling trade has been disorganized by new boundaries which raise obstacles not only to the flow of wheat to the mills but also to the distribution of grain by-products. This situation is intensified by the aversion of the "succession" countries to the employment of the milling facilities of Budapest.

Russia. The return of Russia to the ranks of grain exporters on a considerable scale was a feature of the year. The Russian crops of 1923 were considerably larger than those of 1921, when crop failure occurred in several important districts, or those of 1922, when plantings were greatly reduced for lack of seed and work stock. Broomhall's estimate of the 1923 wheat crop was 240 million bushels, as compared with crops of 160 million bushels in 1921 and 202 millions in 1922.[2] Even at this figure, the crop was probably less than a half, perhaps not over a third of the pre-war harvest. The United States Department of Agriculture estimates the average pre-war crop of the present Russian area, as 735 million bushels,[3] including 584 million bushels for Soviet Russia in Europe and 151 millions for Asiatic Russia.[4] The rye crop, which is of special importance in Russia, was better than the wheat crop, and perhaps within 20 per cent of the pre-war average. Crops of barley and oil seeds, similarly, were good as compared with the preceding years, though smaller than before the war.

Because of the urgent necessity for importing industrial materials and products in order to repair and supply industrial equipment, the Soviet Government adopted the policy of collecting the largest possible volume of products for export, at the expense of domestic consumption and to the extent of even considerable shortage in certain districts. Thus Russian exports were made, not out of a genuine surplus over domestic needs, but out of a surplus created by ruthless neglect of the normal consumption requirements of deficiency districts. This policy was easier to adopt because deficient facilities for internal trade, notably railway transport, made it cheaper to export grain from surplus-producing areas than to distribute it to deficiency areas.

[1] Broomhall's *Corn Trade News,* March 11, 1924.

[2] *Ibid.,* August 19, 1924.

[3] The official estimates for 1923, on the 1911-15 base, are as follows: rye, 83.4 per cent; winter wheat, 64.4; spring wheat, 33.2; oats, 55.7; barley, 50; buckwheat, 134.8; millet, 155; corn, 184.4. *Commerce Reports,* May 26, 1924, p. 546.

[4] *Foreign Crops and Markets,* Sept. 24, 1924, pp. 304-305.

Exercising a monopoly in both internal and external trade, the Government purchasing agency bought all surplus grain in districts producing a surplus, leaving to private trade only the grain for local use. As sole buyer it was in a position to purchase at low prices and could determine how much of the purchases to distribute for domestic consumption and how much to export. Partly because of the currency chaos and industrial disorganization, grain prices were extremely low in the first half of the crop year, rising rapidly in the spring and summer of 1924. The "Gosplan" reports prices in South Russia and export regions as follows, in cents per bushel:[1]

	Wheat	Rye
Aug. 1, 1923	79	39
Sept. 1, 1923	62	36
Aug. 1, 1924	141	80
Sept. 1, 1924	130	70

The export business was handled through the Government sales monopoly, with foreign headquarters in Berlin and London and subsidiary offices in other leading centers throughout Europe. In general, this office won the business esteem of grain-importers by its prompt and satisfactory fulfillment of contracts. The government instituted a modern system of grain-grading. With a view to securing the best selling prices and establishing its prestige as a grain seller, it shipped out only the best grades from a crop of high average quality. Consequently, Russian wheat and rye exports compared favorably in quality with the best grain imported into Europe from other export areas. But notwithstanding the low price at which grain was purchased, the export business was far from profitable. "Krassin, the head of the foreign trade monopoly, estimates that export expenses, including transportation, during 1923–24, amounted to more than 60 cents a bushel."[2]

Reliable statistics of Russian grain exports are impossible to secure. Last May, Soviet authorities, whose figures are likely to be excessive, announced that exports of grain and oilcake for the year ending June 1, 1924, were 4,013,000 short tons.[3] More recent information puts the figure at about 3 million short tons. Trade figures account for some 2,320,000 short tons of the five chief cereals in the year ending June 30, distributed as follows:

Wheat	23.1	million bushels
Rye	42.5	" "
Corn	5.2	" "
Oats	2.7	" "
Barley	19.4	" "

Including minor cereals and oil-cake, it is safe to say that the aggregate export was between 2½ and 3 million short tons.[4] A total of 66 million bushels of wheat and rye represents about 35 per cent of the average exports of bread grains from the Russian Empire in the five pre-war years 1909–14. The rye exports in 1923–24, however, were considerably greater than before the war, and the wheat exports only about 15 per cent of the pre-war exports.

The Russian exports were distributed among many countries. Germany took the largest amounts, partly through direct shipments to German ports, partly through shipments via Rotterdam and the Rhine. But Finland, Scandinavian countries, Holland, Belgium, Great Britain, France, and Italy all imported considerable Russian grain.

The bulk of the exports were shipped out in the first eight months of the crop year. By April 1924 it was evident that Russian exports had been excessive. Domestic prices of grain had risen to a point exceeding prices in foreign ports, and complaints of domestic shortage were rife. Accumulating evidence throughout the spring and summer pointed to reduced crops in 1924, making exceedingly problematical the quantity for later export, even with the continuance of the ruthless export policy. Comparatively little grain was shipped from Russia after mid-April.

[1] *Foreign Crops and Markets,* Nov. 12, 1924, p. 491.
[2] *Ibid.*
[3] *Foreign Crops and Markets,* June 25, 1924, quoting Moscow *Pravda,* May 10. See *Commerce Reports,* Feb. 25, 1924, p. 499, and *Foreign Crops and Markets,* Feb. 6, 1924, p. 130, March 19, 1924, p. 240, for earlier figures compared with pre-war averages, with some details by crops and destinations.
[4] *Foreign Crops and Markets,* Nov. 12, 1924, pp. 489, 497. Cf. Broomhall's *Corn Trade News,* April 23, Aug. 6, 1924.

Russian grain production is seriously handicapped by the shortage of work stock and modern farm machinery, and by the gross inefficiency of farming methods. Furthermore, there is only a weak stimulus and slight opportunity to improve in these respects. Such conditions appear to be getting better rather than worse, but at a snail's pace. The abandonment (since 1921) of the policy of confiscating surplus crops, and the substitution of a policy of purchase for the policy of exacting taxes in kind, has removed a special handicap upon farmers capable of producing a surplus. But the abnormally low prices paid to farmers for the 1923 crop did not improve the peasant's ability or disposition to work for increased output. Transportation facilities, particularly for export, have been considerably improved since 1921, but are yet much below normal. In the current year, though acreage was increased, unfavorable weather conditions so greatly reduced the yields per acre that exports bid fair to be negligible. No rapid recovery of Russian grain production is in early prospect. A true surplus of production over domestic requirements may not be achieved for years, except under specially favorable weather conditions; and the amount exported will depend not merely on the size of the crops but on the effective policy of the government. All things considered, however, Russia must ordinarily be reckoned a substantial factor in the world wheat trade.

This review of the surplus-producing countries, outside the United States, throws into relief the high level of production in these areas, the huge exports from Canada, Argentina, and Australia in spite of low world prices, the re-entry of Russia as an important grain exporter even with moderate crops, and the forces tending to restrict exports from the Danube basin. The net export of wheat and flour from these areas was a third larger than in 1921–22. As compared with pre-war averages, the net export of these areas was 120 million bushels larger; the decline in Russian, Danubian, and Indian exports being much more than offset by increases from Canada, Argentina, and Australia.

VII. DEVELOPMENTS IN THE UNITED STATES

Of the four leading wheat export areas, the United States is the only one whose consumption greatly exceeds its exports, the only one which normally exports its lower grade wheat and flour while retaining the best for domestic consumption. In the past crop year, the United States was exceptional for several other reasons. Instead of a record crop of high quality such as was obtained in Canada and the Southern Hemisphere, the United States harvest yielded less than the average per acre and was below average in quality, especially in protein-content. The acreage harvested was also less than in recent years. With low prices and fairly high costs per bushel, the financial return from the crop was exceptionally small. Moreover, export expectations were not fulfilled. Early in the year it appeared that, with a carryover well above average, the United States would have a large export surplus, though less than in the preceding year. But as the record crops of Canada and the Southern Hemisphere were harvested and large quantities of excellent wheat came upon the international market at low prices, it became increasingly difficult for American exporters to get rid of their low grade surplus. Consequently, exports rapidly declined, and throughout most of the year American grain, except durum and Pacific white wheats, was scarcely a factor in the international market.

Supplies Somewhat Reduced. Emphasis has been placed upon the abundance of the wheat supply in 1923–24. In the United States, however, supplies were not remarkably large or small. The crop year opened, indeed, with a large carryover from the preceding year, estimated at 102 million bushels, 21 million greater than that of 1922 and 14 million above the 1909–13 average. Both in commercial warehouses and at country points stocks were considerably above those of the preceding year and the pre-war average;[1] but they were not so

[1] See Appendix Table XV. This table does not include flour stocks, for which no comprehensive data are available.

large as to glut the market or in any other way seriously to depress prices.

The 1923 crop, finally estimated at 797 million bushels, was quite the smallest since the war, but still 116 million bushels above the 10-year pre-war average, and well above normal domestic requirements. As

TABLE 22.—ACREAGE, YIELD, PRODUCTION, AND FARM VALUE OF WHEAT IN UNITED STATES, PRE-WAR AND POST-WAR*

Year	Acreage harvested (Million acres)	Yield per acre (bushels)	Total production (Million bushels)	Farm value Dec. 1 (Million dollars)
1904–13	47.2	14.4	681	570
1919	75.7	12.8	968	2,080
1920	61.1	13.6	833	1,197
1921	63.7	12.8	815	755
1922	62.3	13.9	868	873
1923	59.7	13.4	797	736
1924	54.2	16.1	873	1,137

* U. S. Dept. of Agric., *Yearbook 1923*, p. 602, supplemented by final crop report for 1924.

shown by Table 22, the reduced crop was due both to reduced acreage (from the preceding years) and to yields below normal, while the excess over pre-war crops was due, in spite of low yields per acre, to the harvesting of larger acreage.

The reduction in acreage harvested in 1923 (which continued in 1924) was due primarily to reduced plantings on account of the persisting unprofitableness of wheat production in the United States at prices ruling in 1921–23. The conditions which had occasioned great expansion in wheat acreage had ceased to exist, and seemed unlikely soon to return. Ordinarily wheat plantings are not greatly influenced by current prices or the immediate price outlook, but in this case these influences had been reinforced by severe losses over two preceding years.

Kansas farmers reduced their area of hard winter wheat for the 1923 crop by 2 million acres. In other important western winter wheat states there were comparable though smaller reductions. Spring wheat farmers of the Dakotas, Montana, and Minnesota followed this lead with a cut of over a million acres. East of the Mississippi, however, in the soft-wheat area, there was an appreciable increase in acreage. In the far West there was no material change in either winter or spring wheat planting. The total area planted to winter wheat was 46,100,000 acres, as compared with 49,800,000 in the preceding year and 31,800,000 as the 10-year pre-war average. The spring wheat acreage was 20,100,000 compared with 20,000,000 in 1922 and 18,100,000 before the war.[1]

With such a reduction in acreage there was reason to anticipate a smaller crop than in the preceding year. As the season progressed it became more and more apparent that weather conditions were not favorable to a large crop. There was a heavy abandonment of winter wheat between December and April, the acreage harvested being estimated as 6,600,000 acres less than that planted.[2] Although there was some improvement in the winter crop during the later growing season, the spring wheat crop suffered steady and marked deterioration, and both came to harvest in condition well below average. As estimated on December 1 at 786 million bushels, the crop was 31 to 35 million bushels below the June 1 and July 1 forecasts. The revised figures, issued December 16, 1924, show an increase of 11 million bushels, to 797 millions.[3]

Shortage of Hard Wheats. Although the crop exceeded domestic requirements there was a shortage of high grade hard wheat, which, with present milling and baking practices, is required by millers for the production of "strong" flours commonly used by the baking trade.[4] The spring wheat crop, though of high quality, was short. The hard winter wheat crop was of mediocre quality and of moderate size. The surplus consisted of durum and Pacific white wheats, which have special markets abroad, and of mediocre and low grade winter wheats, chiefly hard but partly soft, which were not in great demand at home.

To supply the deficiency in good hard wheats some 27 million bushels of Cana-

[1] See Appendix Table III.
[2] *Idem.*
[3] See Appendix Table V.
[4] See C. L. Alsberg, "The Coming Hard Wheat Deficiency," *Baking Technology*, February 1924, pp. 54-58.

dian hard spring wheat were imported, about half of it for domestic consumption, the other half for grinding into high grade flour for export.[1] The imports for domestic consumption were subject to the tariff, and came in mostly before the duty was raised from 30 cents to 42 cents. Both classes of imports were subject to heavy transportation charges. Consequently through much of the year No. 1 Dark Northern Spring at Minneapolis was from 25 to 35 cents a bushel higher than No. 1 Northern Manitoba at Winnipeg, and at times the Minneapolis price was well above the Liverpool price of Canadian wheat.[2] High grade hard winter wheat was also comparatively high in price because it was substituted for hard spring wheat. No. 2 Hard Winter was not quoted in Liverpool after November 1923. Though some 19 million bushels of Hard Winter wheat were exported, most of it graded No. 2 by inspectors at ports of shipment, it is admitted in the trade that this consisted largely of comparatively low grade wheat.

Low Wheat Exports. The result of these conditions was a great reduction in the amount of wheat exported as grain, amounting for the year ending June 30, 1924, to only 78 million bushels, by all odds the smallest grain export since the war.[3] By no means the full exportable surplus of lower grade wheat was exported, since in competition with the abundant supplies of hard wheat on the export market these wheats were salable only at a discount; and since, at such prices, far below domestic prices for good hard wheats, farmers preferred to use larger quantities on the farm. Pacific white wheat, which normally does not move eastward in the United States, found a ready market abroad. Indeed in Liverpool it frequently sold at a premium over other wheats. Durum wheat, suitable chiefly for the manufacture of alimentary pastes, was exported at prices in line with the prevailing low world prices of other wheats, but in the United States was more largely used than heretofore for mixing with other spring wheats for the manufacture of flour.

Exports of wheat as grain were equalled by exports as flour, produced in part from Canadian grain, of which about 14 million bushels were imported in bond for grinding into export flour. The flour exports consisted, as usual, of two distinct types—high-grade trade-marked flours sent to select and tropical markets abroad, and low grade flours, chiefly "clears," which are not marketable to any extent in the United States and are essentially a by-product of the milling of high-grade flour for domestic use. The demand from the Orient and the relatively improved position of certain European markets made possible a flour export exceeding that of the previous two years.[4]

Relations Between World Prices and American Prices. The world price of wheat, in the loose sense in which this term is used, was largely determined in 1923–24 by considerations outside the United States, primarily the abundant supplies resulting from high crop-yields per acre. The developments in the United States tended to check the tendency to declining prices rather than to accentuate it. To the international supply the United States contributed a net export of only 127 million bushels in grain and flour, much less than in any other recent year and a smaller proportion than before the war.[5] Undoubtedly a larger contribution from the United States, which would have been forthcoming if acreage, yields, and quality had not been reduced, would have tended to lower the world price still further.

[1] See below, p. 37.

[2] See Appendix Table XVII, Chart 1, p. 3, and Chart 5, p. 35.

[3] See Appendix Table XXII for a partial and imperfect classification of these exports compared with those of previous years.

[4] See below, p. 36.

[5] Compare the following percentages of United States production and net exports to world production and net exports (computed from data of International Institute of Agriculture):

Crop year	Crops (ex-Russia)	Net exports: Wheat	Net exports: Wheat and flour
1909–14	23.0%	11.2%	16.3%
1919–20	*a*	25.9	41.1
1920–21	28.8	47.1	48.7
1921–22	26.2	33.5	36.7
1922–23	27.5	23.9	28.4
1923–24	22.7	7.8	16.1

a Not available.

It is ordinarily assumed that the United States prices of wheat are determined by the world price, less costs of shipment from American markets to Liverpool. This assumption is by no means wholly sound, even in years when the United States is a large wheat exporter, since in certain markets and for certain wheats domestic considerations make prices more or less independent of world prices. For 1923–24, the assumption was quite untrue, except for durum, Pacific, and low grade wheats. Other wheats were generally well above the world price level (allowing for shipment costs), owing to the domestic shortage of these wheats and to the tariff, which unquestionably restricted the import of Canadian wheats.

The influence of world prices on United States prices was exerted through the competition of our exports in the world market and the competition of these export wheats with other wheats in the domestic market. Had there been no exportable surplus at all, undoubtedly wheat prices in the United States would have been higher than they were. On the other hand, had the same exportable surplus consisted of high grade wheats, less wheat would have been fed, more would have been exported, the world price would probably have been lower still, and United States prices would probably have been much more closely in accord with the world price, and considerably lower than they actually were.[1]

Heavy Farm Consumption. As a result of low prices, particularly for low grade wheats, and of a larger amount of unmerchantable wheat than usual, more than the usual quantity was fed in 1923–24 to animals. Furthermore, the relatively high price of corn, particularly in the first five months of the crop year, made it financially advantageous for farmers in many sections to substitute some wheat for corn as feed.[2] Such substitution is not practiced to the full extent which might seem economical, chiefly because of inertia, ignorance of relative feeding values and of appropriate methods of preparing wheat for feeding, lack of proper equipment, and so on. Nevertheless there is no doubt that some such substitution was made.

No statistics of wheat used for feed are assembled, and reliable estimates are exceedingly difficult to obtain. Reporting to the Department of Agriculture in November 1923, farmers in twenty-seven leading wheat states indicated an intention to use 11.6 per cent of the crop for feed, some 92 million bushels, as compared with a reported usual disposition of 8 per cent for this purpose. The Department stated, however, that because of the unsatisfactory wheat-price situation at the time of the inquiry, these estimates might be slightly excessive. A summary of the wheat supplies available in 1923-24 and their disposition,[3] in which most elements except farm consumption can be approximated within narrow limits, leads to the conclusion that some 94 million bushels were used for feed on the farms. This figure is probably too high,[4] but it is difficult to avoid the conclusion that the use of wheat for feed was much above average in 1923–24. The domestic utilization for food and feed was about 5.3 bushels per capita, well above figures for recent post-war years, but slightly below pre-war averages.

TABLE 23.—UNITED STATES WHEAT SUPPLIES AND THEIR DISPOSITION, PRE-WAR AND POST-WAR CROP YEARS ENDING JUNE 30

(Million bushels)

	1909-14	1921-22	1922-23	1923-24
Available supplies	781.9	932.4	976.5	937.9
Exports, wheat and flour	105.0	279.4	221.9	156.4
Domestic use	580.0	564.0	642.1	668.6
Stocks, June 30	96.9	89.0	112.5	112.9

Table 23 summarizes the general situation in the United States as regards wheat

[1] A contrary view is expressed in the U. S. Dept. of Commerce *Trade Information Bulletin No. 210*, "International Competition in the Production of Wheat for Export," March 17, 1924, pp. 4, 25.

[2] See table on corn prices and equivalent wheat prices based upon relative feed values of the two grains for poultry, sheep hogs, and beef cattle, and comparative farm prices of corn and wheat, in U. S. Dept. of Agric. *Yearbook 1923*, pp. 130, 624, 674. A comparison state by state where both corn and wheat are produced would emphasize the point.

[3] See Appendix Table VII (*A*).

[4] Mr. Nat C. Murray of Clement Curtis & Co., a leading unofficial observer, estimated in August that 56 million bushels of the crop had been used for feed. Later he was inclined to revise this estimate downward.

supplies and their disposition in the past three years as compared with the 5-year pre-war average.[1]

Financial Difficulties and Proposed Remedies. The year 1923–24 was clearly a bad year for American wheat producers. Despite the advantage afforded by a level of wheat prices above the international level for much of the crop, United States wheat farmers suffered acute financial distress, the more severe because the two preceding crops had also been unremunerative.[2] The crisis was especially acute in the semi-arid sections extending from western Kansas and eastern Colorado to the Canadian border. Although there has been a tendency to exaggerate the distress, to generalize from the plight of the one-crop wheat farmers, and to overlook the reserve strength of farmers, the broad fact is clear. It is consistently reflected by numerous indicators, such as increased foreclosures and bankruptcies, frozen loans, delinquent taxes and interest payments, small buying of farm equipment, and the resort to public resources for feed and seed loans.[3]

Low farm prices, low yields per acre, and high costs of cultivation per acre were not, of course, the sole factors in causing this distress. In part, it was due to purchases of lands at high prices and excessive use of credits during the boom period of 1918–20, in part to the operation of unsuitable lands and the resort to wheat farming by men ill-adapted to it or inexperienced in it, in part to the catastrophic decline in the general price level in 1920–21 after price inflation and to the maintenance of prices of products purchased by the farmer at a level somewhat above the general price level. Still other causes may be adduced. Nevertheless, prices and yields were the important influences which affected the wheat farmer in particular.

Naturally this situation called forth numerous proposals for the relief of the wheat farmer, by his own efforts, by legislative measures, and otherwise. Some of these were carried into effect during the year.

In February Congress extended the life of the War Finance Corporation to the end of 1924, primarily for the benefit of the wheat farmer. The Corporation made extensive loans to assist in marketing the crop, opening a branch office in North Dakota to aid and supplement insolvent banks serving that wheat section. Seed loans were made rather widely, by county, state, and federal agencies, as well as by private groups. On recommendation of the Tariff Commission, the President raised the duty on wheat, effective April 7, from 30 to 42 cents a bushel.

Other proposed palliatives or remedies failed of adoption. Various schemes for large public or private loans to Germany, or a national gift to Germany, to assist in the importation of wheat and other foods, were regarded in part as aids to the wheat farmer; but they were not adopted. The Interstate Commerce Commission, in response to a widespread demand for reductions in freight rates on grain, made an extensive investigation, but eventually, on July 17, 1924, declared the existing rates reasonable. The most elaborate proposal for farm relief was the McNary-Haugen bill, which called for setting up an agricultural export corporation, operating with a federal appropriation of 200 million dollars, to purchase certain classes of agricultural products at prices bearing the same relation to the general level of prices as obtained, on the average, in five pre-war years, and to maintain these prices in this country by sale abroad of the surplus which could not be sold at home. Though strongly supported in many quarters, the bill was defeated in the House near the close of the session in June.

[1] See Appendix Table VII (*A*) for details.

[2] Returns to the Department of Agriculture from a questionnaire lead to the conclusion that in 1922 the net cost of producing wheat on some 2500 farms was $1.23 per bushel, while the farm value of the product was only $1.11; similar figures for 1923 for some 8,000 farmers showed a net cost of $1.24 per bushel as compared with a farm value of $0.99. "Cost of Producing Corn, Wheat, and Oats—1922," *Weather, Crops and Markets,* Sept. 1, 1923, p. 218; and "Cost of Producing Field Crops—1923," *Crops and Markets, Monthly Suppl.,* June 1924, p. 176. These figures, while subject to a wide margin of error, bear out a conclusion for which very little precise evidence can be presented.

[3] See especially reports to the President on the wheat situation in November 1923, by Henry C. Wallace, Secretary of Agriculture; and by Eugene Meyer and Frank W. Mondell of the War Finance Corporation.

Not as means of immediate relief, but as measures calculated to improve basic conditions, wheat growers were strongly urged to reduce their wheat acreage and to diversify their farm efforts; and progress was made in both directions. To promote diversification, the Norbeck-Burtness bill was drawn up, calling for public loans to farmers; but this failed to pass. An Agricultural Credit Corporation, with a capital of 10 million dollars, was formed in the spring, as the outgrowth of a conference called by the President, to extend credits to farmers in the Northwest. There was also much agitation for the extension of coöperative marketing among wheat farmers, despite some unsatisfactory experiences of wheat-marketing coöperatives in recent years; and early in the summer a coöperative Grain Marketing Company was formed, on a new plan.

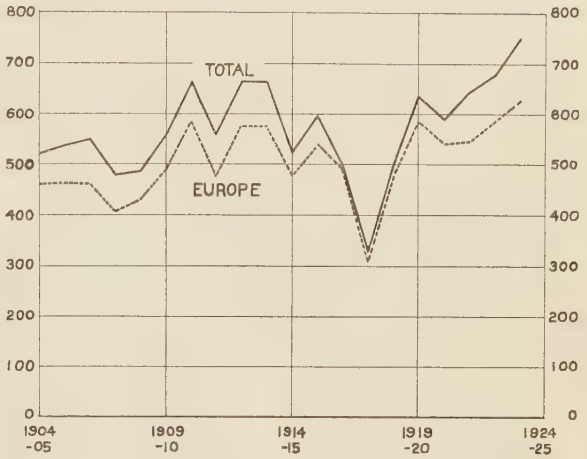
It is safe to say that the relief measures adopted were of limited importance, and that most of those which failed of adoption were defective either in disregarding the causes of the emergency or in failing adequately to take these causes into account. The change in the American wheat-farmer's position in 1924 has come not from the adoption of any remedies, but from a marked change in the peculiar combination of circumstances which created his difficulties.

VIII. HEAVY INTERNATIONAL MOVEMENT

The international movement of wheat and flour in 1923–24 was the largest in the history of the world. Broomhall's figures for world shipments of wheat and flour,[1] admittedly incomplete and inexact, but still a fair approximation of the world's international wheat movement, reached in 1923–24 the record figure of 775 million bushels, as compared with 676 million in 1922–23, the largest post-war year, and 622 million, the average of five pre-war crop years. The exceptional magnitude of the movement is illustrated in Chart 3, which shows Broomhall's figures for shipments to Europe and to all destinations by crop years since 1905–06. Appendix Table IX summarizes the same data by areas of shipment and destination for the past five crop years compared with pre-war and post-war averages.

CHART 3.—WHEAT AND FLOUR SHIPMENTS AS REPORTED BY BROOMHALL, FOR CROP YEARS, 1905–24 *

(Million bushels)



* Source: Broomhall's *Corn Trade News*.

North American shipments were about the same as in 1922–23, but nearly 2½ times as large as before the war. Argentine and Uruguayan shipments were 174 million bushels, a record figure, as compared with the large figure of 138 millions in 1922–23 and a pre-war average of 82 millions. Australian shipments, 78 millions, though smaller than in two recent years, were 30 millions larger than in 1922–23, and compare with 54½ millions as a pre-war average. British India's shipments, 17½ million bushels, were small as compared with the pre-war average of 47 millions, but larger than in any post-war year except 1922–23. North African shipments, though absolutely small, were relatively high. Shipments from Russia and the Danube

[1] See Appendix Table X for statistics of net exports and net imports of wheat and flour. In most cases Broomhall's figures of shipments are somewhat lower than corresponding figures derived from official statistics of net exports, while his figures for shipments to Europe are higher than official statistics of net imports by European countries. It is impossible to reconcile the figures, though various reasons for the differences could be pointed out.

area, 36 million bushels, were very small by comparison with pre-war years, but much larger than in any previous year since the war. In short, the reductions in European export areas were much more than made up by increases from North America, the Plate, and Australia.

As usual, the bulk of the shipments went to European deficiency countries, which, according to Broomhall, were the destination of 626 million bushels in 1923–24 as compared with 586 million in 1922–23, and an average of 541 million in the five pre-war years; but a record volume also went to ex-European destinations, 149 million, as compared with 90 million in 1922–23 and an average of 82 million in 1909–14. The official statistics of imports tell much the same story of large shipments, but show net imports to Europe considerably smaller than Broomhall's figures, and somewhat less than in 1922–23.

A movement of this magnitude was not anticipated during the early part of the crop year, when it was estimated that total shipments would be less than in the preceding year. It was expected that heavy crops in Europe, the chief importing region, would make large imports unnecessary. The first estimate made by Broomhall's *Corn Trade News* on August 14, 1923, for example, placed total shipments at only 632 million bushels, which may be compared with Broomhall's final estimate of 659 million bushels for 1922–23.[1] Sir James Wilson in October 1923 predicted a movement of 640 million bushels compared with his final estimate of 693 million bushels for the preceding year.

It has already been noted that certain European countries which are heavy importers had rather light crops in 1923.[2] They began to import more heavily than in the previous year, while other nations did not decrease their imports to the extent expected. In addition, heavy purchases made by China and Japan soon began to affect the movement of grain, and shipments became considerably greater than had been anticipated. As the new developments became apparent, Broomhall successively increased his estimate[3] to a final figure of 768 million bushels, 136 million bushels greater than his original estimate. Sir James Wilson's second estimate, which appeared in May 1924, placed the total shipments at 720 million bushels, an increase of 80 million bushels over his earlier estimate.

As a basis for appraising the outlook for future wheat movements, it is essential to summarize the factors which account for this unexpectedly huge international movement in 1923–24. In retrospect, four appear to deserve emphasis.[4]

First, the low level of wheat and flour prices, particularly in relation to other commodities (see Section II, above), gave a marked stimulus to wheat-consumption, both as food and feed, in importing countries as well as in exporting countries. Farmers, discouraged by low market prices, used more wheat locally, and with reduced domestic supplies in internal grain markets larger imports were necessary to meet requirements of urban consumers. In comparison with the previous year, European potato crops were mediocre, especially in Germany, so that there was a tendency to substitute wheat for potatoes, both directly and indirectly. The availability, at such low prices, of abundant supplies of high grade wheat from Canada, was especially tempting.

Secondly, Europe, except Germany, was on the whole somewhat busier and more prosperous in 1923–24 than in the preceding year. The purchasing power of the populace was somewhat higher. Moreover, particularly in the last few months of the year, the international purchasing power of Europe, owing to improved exports and easier foreign credits, was somewhat enlarged, as compared with the corresponding period of 1922–23. This was true even in Germany, where low wages and unemployment reduced consumptive demand.[5]

[1] See Appendix Table VIII.

[2] United Kingdom, Denmark, Belgium, and Netherlands; see p. 12.

[3] On Oct. 16, Dec. 4, 1923; Feb. 5, May 13, and June 24, 1924.

[4] It is also to be noted that Broomhall's figures for 1923-24 include 53 weeks, whereas his usual year is 52 weeks.

[5] See Joseph S. Davis, "Economic and Financial Developments in Europe." *Review of Economic Statistics,* July 1924.

Third, the prospects for late and poor harvests in Europe in 1924 increased the demand in the later months of the crop year,—prospects which have been, on the whole, more than borne out as the harvesting and threshing have proceeded.

Finally, there was an exceptional demand from the Far East, due in part to low wheat and flour prices, in part to small domestic crops of wheat and (to a more important degree) of rice; and in part to the suspension of the Japanese import duties after the earthquake, from September 1923 to March 31, 1924.

Favorable Tariff Influences. Furthermore, the tariffs in leading importing countries generally favored larger imports in 1923–24.[1] Great Britain, Denmark, Holland, China, and Hong Kong maintained their traditional policy of unrestricted import of wheat and flour. Germany has recently maintained no tariffs on wheat and flour, though before the war she imposed substantial protective duties on both. Belgium continues to admit wheat free, and her duty on flour is small. Italy, which before the war had high duties on both wheat and flour in 1923–24, admitted wheat free of duty and flour at a very low rate. French import duties were only two-thirds of pre-war rates early in the year, and in January 1924 were reduced by half until August 1. Japan's high duties on wheat and flour were suspended after the earthquake in September 1923 and reimposed only from April 1, 1924. Brazil's duties on wheat and flour were temporarily reduced 40 per cent in March 1924. Import duties were higher than before the war only in a few countries which import little wheat or flour,—notably Mexico, Finland, Spain, and Turkey.

Broadly speaking, changes in tariffs on wheat and flour depend upon the position and relative strength of the agricultural interests and the industrial classes interested in low costs of living. High tariffs on wheat and flour are designed to stimulate domestic production. High tariffs on flour as compared with wheat are designed to encourage domestic milling. Both, however, tend to raise domestic bread prices and are opposed by spokesmen of the working classes because of their tendency to increase costs of living. Since the war, and especially in 1923–24, the influence of the industrial classes has been sufficiently strong to outweigh the arguments of farmers' representatives.

The Movement Through the Year. The course of the movement in 1923–24 reveals certain characteristics of the pre-war and earlier post-war period,—notably the great variation in exports from individual countries in the different months of the year, and the more uniform distribution of total exports through the year. This is illustrated by Chart 4 (p. 34), which shows exports for principal exporting areas by months for 1923–24 compared with pre-war and post-war averages. The peculiarities of the movement in 1923–24 are largely accounted for by the huge Canadian exports, which were especially heavy in November, December, and May, and by the small exports of United States wheat as compared with other post-war years.

During the first two months of the crop year the United States was the leading exporter, as may be seen from the chart and Table 24. By November the shipments were considerably lower. They remained light throughout the remainder of the year, being held up only by flour exports and grain shipments to the Orient. In October the United States was succeeded by Canada in the rôle of leading exporter. While the wheat crop of Canada was finally reported as record-breaking, the harvest was late. This made it doubtful whether a correspondingly heavy export of wheat could be effected before the closing of navigation on the Great Lakes. During the early fall,

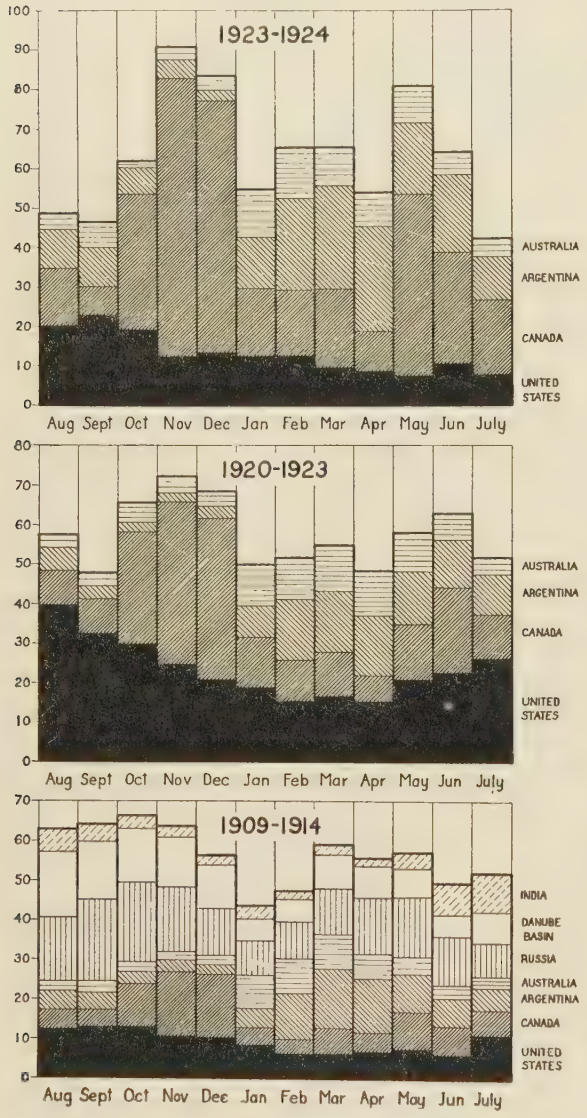
Table 24.—Rank of Leading Exporting Countries by Quarters, During the Crop Year 1923-24

	Aug.–Oct.	Nov.–Jan	Feb.–Apr.	May–July
United States	1	2	4	3
Canada	2	1	2	1
Argentina	3	3	1	2
Australia	4	4	3	4

[1] See especially U. S. Dept. of Commerce *Trade Information Bulletin No. 233*, June 2, 1924: "Foreign Import Duties on Wheat, Wheat Flour, Meat, and Meat Products" by Frank W. Fetter and Henry Chalmers.

CHART 4.—EXPORTS OF WHEAT AND FLOUR FROM PRINCIPAL EXPORTING COUNTRIES BY MONTHS, 1923–24, AND FOR CROP YEARS 1920–23 AND 1909–14, AVERAGING IDENTICAL MONTHS *

(Million bushels)



* Source: *International Yearbook of Agricultural Statistics* and *International Crop Report.*

moreover, marketings by farmers were lower than in the previous year, as shown by platform loadings and the receipts of grain at country elevators.[1] By the middle of November the receipts of grain at Fort William and Port Arthur exceeded those of 1922 and the shipments from these ports became heavier. The lakes remained open a week longer than in the preceding year, and it soon became apparent that fall shipments would exceed even the immense export of the previous season. In the two months of November and December, 1923, Canadian exports were nearly 135 million bushels, most of which passed out through the Great Lakes.

By February the exports from the Southern Hemisphere had assumed the dominant position, and they continued to be large through March and April. The Argentine crop harvested in January 1924 was large, and heavy exports followed throughout the remainder of the crop year, although the movement was heaviest in February, March, and April, despite high rates of ocean freight.[2] Australian shipments were also heavy as a result of the good crop. Consequently, the shipments from the Southern Hemisphere in the early spring were considerably larger than the average for the post-war years.

With the opening of navigation on the Great Lakes on April 19, exports from Canada became unusually large; over 45 million bushels were exported in the month of May. In May the exports of flour from Canada exceeded those from the United States, a remarkable occurrence considering the dominant position which the United States has occupied in the flour export business for many years. The heavy movement of Canadian grain continued throughout the remainder of the crop year, and the total export of nearly 350 million bushels of wheat and flour broke all records for shipments from a single country.

Exports from India were small throughout the year, but increased greatly in June, although the total export in that month was only 8 million bushels. Exports from North Africa, the Danube basin, and Russia were made largely during the early portion of the year, but the total was small compared with the movement from the four leading exporters.

A comparison of the course of the movement of wheat shown by the official export figures and the shipments reported by

[1] Dominion Bureau of Statistics, *Report on the Grain Trade of Canada*, 1923, p. 57.

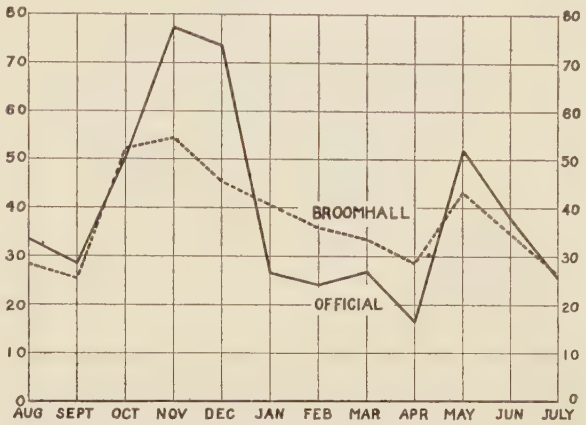
[2] See Appendix Table XIII.

Broomhall's *Corn Trade News* is of considerable interest. Broomhall's shipment figures show a high peak in the total movement in December but an even higher one in February. The official export figures, on the other hand, show the highest point in December, with only a very minor peak in February. The difference is explained primarily by the fact that Canadian exports, which go by way of the United States, are reported by the Canadian Government as they leave Canada, chiefly in October, November, and December, but do not appear in Broomhall's shipments until a month or more later, the time being spent in transit on the Great Lakes and railways leading to the seaboard, or in storage at ports of shipment. In November and December, 1923, 84 million bushels of Canadian wheat and flour were exported from Canada through the United States to be actually shipped abroad in succeeding months. This difference is shown graphically in Chart 5, which compares the monthly exports from Canada and the United States with Broomhall's weekly shipments from North America placed upon a rough monthly basis.[1]

Large Flour Movement. The international movement of flour was exceptionally large in 1923–24, and was 25 per cent larger than in 1922–23. The aggregate export for the year ending July 31, 1924, was some 46½ million barrels, as compared with 38½ millions in the preceding year.[2] Practically every exporting country, including several in Europe, showed a considerable increase in flour exports over 1922–23, and a still larger increase over 1921–22.[3] The increases in Argentine, Australian, Hungarian, Italian, and Belgian exports were especially noteworthy. British flour exports increased from 1,508 to 3,239 thousand barrels, while her flour imports slightly

CHART 5.—WHEAT AND FLOUR SHIPMENTS (BROOMHALL) AND NET EXPORTS (OFFICIAL) FROM NORTH AMERICA, MONTHLY, 1923–24 *

(Million bushels)



* Source: Broomhall's *Corn Trade News, International Crop Report,* and *Monthly Summary of Foreign Commerce of U. S.*

decreased, so that, while Britain remained a flour importer, her net imports were little more than half those of 1922–23 and smaller than for many years. As already noted, much of this alteration was due to the separation of the Irish Free State on April 1, 1923. When a country is a net importer of wheat and an active exporter of flour, it possesses an efficient milling industry working on toll.

Europe is a net importer of flour, on a much larger scale than before the war.[4] The most striking change in imports is shown by Germany, which before the war was a large flour exporter. The reported 1923–24 figures for Germany show total flour imports of 4,189,000 barrels as compared with 567,000 in 1922–23. Both figures understate the truth, because in neither year did Germany have full control of her customs offices, and large imports were unrecorded. Since the omission was undoubtedly greater in 1923–24 than in 1922–23, it is safe to say that German flour imports for the past year were five or six times as large as in 1922–23. The increase in British, Belgian, French, and Dutch exports is partly accounted for by sales to German buyers. There were also notable increases in imports by Holland, Austria, and Czecho-Slovakia.

[1] A comparison over a period of years shows that the official export figures run higher than Broomhall's figures of shipments. This is attributed largely to duplication in the official figures, some Canadian grain being counted in both Canadian and United States exports.

[2] *International Crop Report and Agricultural Statistics,* September 1924.

[3] See Appendix Table XI.

[4] *Idem.*

Over 60 per cent of the large flour exports in 1923–24 came from North America. Exports from the United States, for the year ending June 30, were 17¼ million barrels, roughly equal to the gross exports

Table 25.—United States Exports of Wheat Flour, Pre-War and Post-War Years Ending June 30

1898–1904, 6-yr. ave.	18,385,164 bbls.
1909–1914, 5-yr. ave.	10,678,635 "
1917–1920, 3-yr. ave.	22,571,207 "
1920–21	16,180,226 "
1921–22	15,796,822 "
1922–23	14,882,806 "
1923–24	17,252,620 "

of wheat as grain. As shown by Table 25, these exports were larger than in any of the three preceding years, and 62 per cent larger than the 5-year pre-war average. They have been exceeded in only two previous periods, the six years 1898–1904, when the average export was 18½ million barrels a year, and the three years 1917–20, when the average was 22½ millions.

Canadian flour exports continued in 1923–24 their notable increase of recent years.[1] The exports for the Canadian crop year were 12 million barrels, the largest ever reported, three times the average exports for 5 pre-war years and within 30 per cent of the United States exports for the year. Australia, with exports of over 5 million barrels, has come to rank third as flour exporter, whereas before the war her exports were very small.

Italian flour exports became important for the first time since the war, and were the largest ever reported. Large crops, stable financial conditions favoring grain imports, commercial treaties with Jugo-Slavia and Austria, impressive financial improvement in Austria, and economic recovery in other nearby markets, such as Czecho-Slovakia and Switzerland, were important contributing factors.

During the middle of the crop year, French flour exports rose to exceptional figures. The official statistics show that the great bulk of the exports went to the Saar region of Germany, which, though under the jurisdiction of the League of Nations, is subject to strong French influence. These figures probably do not tell the whole story. The Franco-Belgian occupation of the Ruhr facilitated the entry of French flour into that area of Germany. The decline of the franc, till the middle of March, put so heavy a premium on German purchases of French flour that in January the French government limited these exports. Nevertheless, German purchasers who had bought on credit were severely pinched when the franc recovered so strikingly in March and April, because fulfilment of their contracts cost so much more than they had expected. This episode resulted in great disorganization of the German grain and flour trade, and extreme depression among south German mills, in the spring months, when much flour had to be auctioned off to relieve the necessities of flour importers.

Features of North American Trade. An increase in the proportion of Canadian grain exported from Canadian seaports was a feature of the year. Whereas in 1921–22 little more than one-third of the grain passed out through Dominion ports, nearly half of the total shipments were made through these ports in 1923–24, as may be seen from Table 26. Canadian shipments

Table 26.—Exports of Canadian Wheat and Flour from Canadian and United States Seaboard Ports, for Crop Years Ending July 21, 1922–24 *

Ports of	1921-22	1922-23	1923-24
	Million bushels		
United States	109.7	150.8	164.8
Canada	58.3	112.5	158.8
Totals	168.0	263.3	323.6
	Percentages of total		
United States	63.3	57.3	50.9
Canada	34.7	42.7	49.1

* Sources: Canadian Dominion Bureau of Statistics, *Report on the Grain Trade of Canada*, 1921, 1922, and 1923; *Canadian Grain Statistics*, August 8, 1924. These figures do not include wheat exported by lake or rail to the United States, hence the totals do not agree with figures of net exports from Canada.

through the Great Lakes and thence out through American ports such as New York, Boston, Baltimore, and Philadelphia were somewhat larger than in 1922–23, but the movement through Canadian ports in-

[1] See Appendix Table XI.

creased at a much faster rate. The development of the port of Vancouver for shipments to Europe via the Panama Canal, and to the Orient, accounts for most of the increase in shipments from Canadian seaboard ports. Exports of wheat and flour from Vancouver for the crop year ending July 31, 1923, were 21½ million bushels. During the following year the export was nearly 59 million bushels, an increase of 37½ million bushels, or four-fifths of the increase in exports from Canadian seaports. Vancouver seems destined to be of increasing importance as a wheat shipment port.

Of equal interest, although of less importance, was the decrease in shipments of United States grain by way of Canada. In the past few years considerable amounts have been exported by way of the St. Lawrence River, especially during the late summer and early fall, when shipments from the United States are largest. These exports by way of Canada were much smaller in 1923–24 than in the two previous years. Thus receipts of United States wheat by public elevators at St. Lawrence River ports, almost wholly for export, were as follows in the past four crop years:[1]

1920–21	14.2	million	bus.
1921–22	33.5	"	"
1922–23	31.5	"	"
1923–24	19.4	"	"

The decline is explained chiefly by reduced American grain exports, particularly of spring wheat, and the larger demand on Canadian facilities for Canadian grain exports.

[1] Dominion Bureau of Statistics, *Report on the Grain Trade of Canada*, 1921, 1922, 1923; *Canadian Grain Statistics*, September 1923 to September 1924.

[2] Approximate figures, which do not check exactly with the final figures of the year, show the distribution as follows in thousand bushels.

	July 1-Apr. 12	Apr. 13-June 30	Total
For consumption, paying duty	13,353	921	14,274
For grinding into flour for export	10,857	3,040	13,897
Totals	24,210	3,961	28,171

[3] See Appendix Table XVII.

[4] See Joseph S. Davis, "Economic and Financial Developments in Europe," *Review of Economic Statistics*, July 1924, pp. 218-220.

An impressive feature of the 1923–24 wheat movement was the importation of 27,284,000 bushels of Canadian grain into the United States. This was the largest importation of any year except that of 1920–21; it amounted to over one-sixth of the gross exports of wheat and flour from the United States. Over half of this was imported for domestic consumption, largely before April 7, thus paying a duty of 30 cents a bushel instead of the new tariff of 42 cents.[2] In addition it bore heavy transportation charges. The rest of it was imported by bonded mills to be ground into flour for export, on which a "drawback" of the duty is allowed.

The explanation for this large movement at such expense into a wheat-exporting country lies in the shortage of hard spring wheat, and the moderate crop of hard winter wheat, in the 1923 crops in the United States. Standards of flour are high and inelastic, so that millers are willing to pay large premiums for hard wheats, if necessary to secure the quantities sufficient to enable them to supply their trade with the customary and preferred qualities of flour. With short supplies of hard wheats in the United States, the price of those wheats rose to a point which not only made export unprofitable but made it remunerative to millers to import Canadian hard wheats often at a price strikingly above Winnipeg and, in certain instances, above Liverpool prices for the wheat.[3] The tariff thus served to "protect" the American growers of hard wheats from bearing the full impact of Canadian competition. On the other hand, it made for higher prices of flour in the United States.

Ocean Freight Rates. The general level of ocean freight rates has been low for two years, owing to the over-supply of world tonnage. Much shipping has been idle; much more has been employed at a loss or at only a slight profit. The unemployment decreased considerably in 1923–24, and during the fall and winter the level of freight rates rose, partly in consequence of shipments to Japan following the earthquake of September 1, 1923.[4]

The heavy wheat and flour movement undoubtedly contributed to increase rates

in 1922–23. On the whole, as shown by Appendix Table XIII, the level of freight rates on wheat was appreciably higher in 1923–24 than in 1922–23, on most of the principal wheat routes. The greatest increases occurred on routes affected by Canadian shipments from Atlantic ports, notably the New York-Liverpool route. On the other hand, rates from Pacific ports were below those of 1922–23, and during most of the year below the 1913 level. In the case of Argentina, the average for the year was lower than in 1922–23, but during the period of heavy shipments rates were much higher than in the corresponding period of the preceding year. On the whole, however, ocean freight rates were not sufficiently high seriously to restrict the international wheat movement, though in the winter months they increased the margin between import and export prices.

The extraordinarily large international movement of wheat in 1923–24 greatly exceeded early expectations, owing to the pressure of Canadian, Argentine, Australian, and Russian supplies on the international market and the unsuspected absorptive capacity of Europe and the Orient, favored somewhat by tariff changes. The movement was heavy throughout the year; but in November–December 1923 and again in May 1924 huge Canadian exports made the aggregate shipments especially large. International shipments of flour were also of record volume, 15 per cent larger than in the preceding year. Sixty per cent of the combined total came from North America, but Argentina and Australia, among wheat exporters, and Great Britain and Italy among wheat importers, also exported heavily, while German flour imports were extremely large. The wheat export movement from North America showed certain peculiarities, resulting from the relatively large exportable surplus of Canada as compared with the United States, and the development of export facilities at Vancouver. Nearly half the Canadian grain moved out through Canadian seaports, while little American grain went out through these ports. Heavy exports of Canadian wheat to the United States were due to the hard wheat deficiency in this country. Ocean freight rates, influenced by the large volume of shipments, were on the whole somewhat higher than in the preceding year, but remained on a fairly low level.

IX. STOCKS AND CARRYOVERS

Statistics of stocks of wheat and flour, though in no sense complete or accurate, afford useful indications of the relative abundance of supplies available at different dates. Significant figures of these are assembled in Appendix Tables XIV–XVI. Broomhall's statements are summarized in

TABLE 27.—BROOMHALL'S ESTIMATE OF VISIBLE WHEAT SUPPLIES, AUGUST 1, 1919–24, COMPARED WITH PRE-WAR AND POST-WAR AVERAGES *

(Million bushels)

Year	North America	Argentina	Australia	U. K. and afloat	Total
1910–14	69.6	1.3	a	50.6	a
1919–23	64.3	3.7	39.7	68.9	176.5
1919	55.7	4.4	120.0	86.6	266.7
1920	50.9	3.7	27.5	89.0	171.1
1921	65.1	3.7	30.0	65.5	164.3
1922	62.4	2.2	3.0	56.0	123.6
1923	87.4	4.4	18.0	47.2	157.0
1924	103.7	6.8	30.0	51.7	192.2

* Compiled from *Corn Trade News.*
a Not available.

Table 27. Broadly speaking, stocks of wheat were ample at the beginning of the crop year, abundant during its course, and large at its close; but the absorption of wheat during the year was so much larger than most expert observers had expected, that the carryover into the current crop year was far less excessive than had been anticipated.

In the United States, according to estimates of the Department of Agriculture,[1] wheat stocks amounted to 102 millions on July 1, 1923, and to 104 millions a year later, as compared with 88 millions as the average for July 1, 1909–13 and 1919–23. Stocks on farms were below average, owing partly to prospects for a large new crop, and stocks in country mills and elevators

[1] See Appendix Table XV.

only moderately above average; but the commercial visible supply (in transit and terminal elevators) was considerably above average July 1, 1923, and larger still July 1, 1924.

Canadian wheat stocks[1] were relatively moderate at the beginning of the Canadian crop year, September 1, 1923, owing to prospects for the huge crop of 1923, but quite exceptionally large on September 1, 1924, in all positions except in transit. Broomhall's estimate of North American visible supplies, of wheat and flour combined, showed 87 million bushels August 1, 1923, and 104 millions August 1, 1924, as compared with a 5-year pre-war average (1910–14) of 70 millions and a 5-year post-war average (1919–23) of 64 millions.[2]

For Argentina and Australia no comprehensive estimates of stocks are available for this period of the year, and the reports of visible supplies are much less significant because the elevator system is but slightly developed in these countries. Comparisons, moreover, are affected by the facts that, particularly in Australia, there were accumulated war stocks in 1919, and that within the past two years elevator construction has substantially increased the available storage space. Suffice it to remark that Broomhall reported the Argentine visible supply on August 1, 1923, as over three times the pre-war average, and a year later over five times the pre-war average, while the Australian visibles were moderate on August 1, 1923, and fairly large at the close of the year.

Since the war no comparable statistics for Continental visible supplies have been reported. Broomhall reports British stocks and wheat afloat for Great Britain, the Continent, and orders. The total of these categories was exceptionally large at the close of the war and until the relinquishment of British Governmental control in 1920. After 1920 it tended downwards until on August 1, 1923, it was somewhat below the corresponding pre-war average. On August 1, 1924, the figure showed a slight increase, to slightly above the pre-war figure.

[1] See Appendix Table XVI.
[2] See Appendix Table XIV.

Russia overexported before the end of the crop year, and carried over small stocks, including no exportable surplus, into the new crop year. Of the large Argentine and Australian crops, considerable amounts, perhaps 105 or 110 million bushels in the aggregate, remained to be exported,—an average figure. Of the good crop of British India, little had been exported previous to August 1, but the bulk of the crop is destined for domestic utilization, and the export fraction, small at best, depends so largely upon the influence of prices that no calculation of stocks, if it were possible, would be highly significant.

Concerning European Continental supplies in 1923–24 a few words are in point despite the lack of statistical information. In general, financial considerations dictated the keeping of only moderate stocks of imported grain, inasmuch as supplies in exporting countries were large and readily accessible at low prices.

In France the crop of 1923 was overestimated. Domestic supplies came from the farms more slowly than had been expected. For a time this was attributed to holding by peasants who expected higher prices. As early as March, however, it was the opinion of the French grain trade that domestic supplies available for central milling were largely exhausted. In Italy, also, the crop of 1923 was probably overestimated. Local consumption and feeding of domestic wheat were unusually large. As early as February domestic supplies were recognized as being exceptionally low, considering the season, and prices of domestic wheat rose rapidly between January and March. In both France and Italy the large imports in the later months of the crop year went largely into current consumption, but in view of the late harvest, there is reason to believe that carryovers of imported wheat were rather above average.

In Germany, the Ministry of Food built up a reserve of wheat and rye early in the year, which it gradually released. For this reason, centrally held stocks were large throughout most of the year. Beginning in December, a period of heavy imports of wheat and flour led to abnormal piling up of stocks, which embarrassed both the

millers and the grain trade in the spring months after the unforeseen recovery of the French franc had caused heavy losses to purchasers of French flour on credit. Restrictions on foreign exchange limited imports in subsequent months, and by the end of the crop year stocks had attained more normal proportions. Both in Germany and in Czecho-Slovakia, however, expectations that import duties would be imposed, or raised, on wheat and flour, led to somewhat larger importations than would otherwise have occurred.

Competent trade opinion agrees that Oriental stocks of wheat and flour were large at the close of the crop year 1923–24. This is borne out both by the extremely heavy movement last year to China and Japan, and by the reports from ports, warehouses, and mills.

In conclusion,—wheat stocks were large throughout 1923–24, in exporting countries in particular and for the wheat world as a whole. Toward the close of the crop year they declined much more rapidly than usual in that period, and the carryover at the end, while larger than usual, made only a moderate contribution to offset the reduced wheat crops of 1924–25.

X. COMPARATIVE STABILITY IN WHEAT PRICES TO MAY 1924

The factors bearing upon the wheat market during 1923–24 have been reviewed. It remains to describe the course of prices in somewhat greater detail, and to suggest reasons for the fluctuations. The movements can best be followed by the aid of Chart 6, showing weekly prices (expressed in dollars) of representative wheats in the leading markets in exporting countries, on the one hand, and on the other, in Liverpool and London, the chief importing markets. Average monthly prices are shown in dollars per bushel, in Appendix Table XVII.

The striking advance in prices in the last two or three months of the crop year, in practically all grades and all markets, is reserved for separate discussion in Section XI, since it was caused by influences radically different from those operating during most of the year. The earlier period, however, was one of comparative stability of prices, on a low level. This is emphasized by Chart 1, on page 3, which covers a period of several years.

Significant Price Movements. Within this period of low and fairly stable prices one may distinguish certain movements, varying with different wheats in different markets. Broadly speaking, there was a rise in the early weeks of the crop year, followed by a decline until December or January, a recovery late in the winter, followed by a decline in the spring. To those tendencies the principal exception was the price in Argentina, which rose steadily until December, and declined in the following three months, without rising materially until June. The early rise and the early decline were greatest in Canada. The characteristics of the movement are most clearly revealed in British prices of Canadian wheat, which was of importance in British markets throughout most of the year.

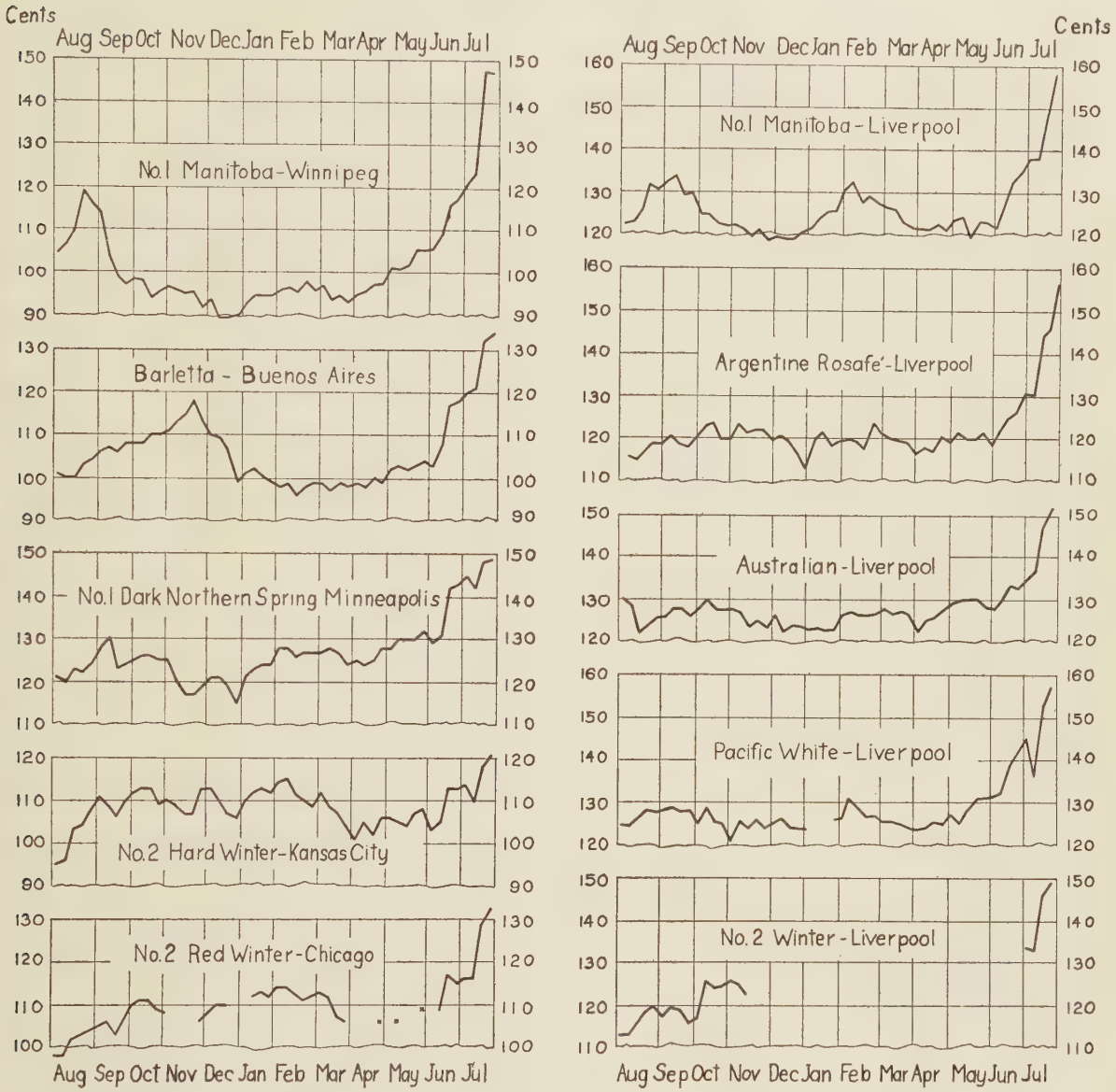
The early rise was attributable to temporary conditions. The new Canadian crop was first decidedly underestimated,[1] was harvested late, and came forward slowly because of transportation difficulties. The seasonal factor alone was important, for Canadian prices are at their maximum in the weeks preceding the marketing of the new crop and drop rapidly when it comes to market. The rise in Argentina was similarly due largely to a seasonal cause, the ending of the Argentine crop year in December. Unfavorable weather conditions during August 1923 and relatively light receipts of wheat at primary markets in September and October were mainly responsible for the strength of prices in the United States during this period. Accordingly, London and Liverpool prices advanced moderately, but not strikingly, because the cheapest export market could be sought.

The advance of Canadian wheat prices

[1] See Appendix Table VI showing monthly forecasts and estimates of recent Canadian wheat crops. The July 31 estimate of the spring wheat crop was 361 million bushels. On August 31 this was raised to 451 millions, which was close to the final official figure.

CHART 6.—WEEKLY CASH PRICES OF WHEAT IN PRINCIPAL EXPORTING AND IMPORTING MARKETS, AUGUST 1923–JULY 1924 *

(U. S. cents per bushel)



* Source: See Appendix Table XVII.

Note: The prices are for Friday of each week, except the Argentine Rosafé prices, which are for Tuesdays.

was quickly followed by decline, both in Canada and in Liverpool, as Canada's bumper crop began to flow to market; and other prices in England tended downward under the influence of competition from Canadian wheat. In the United States the slump was small because of special conditions, including limited supplies of good wheat, tariff protection, light marketings, and strong domestic milling demand. But spring wheat, though it remained relatively high in price, declined as the new crop came to market, reaching a low point late in December. Argentine prices failed to share in this decline, for seasonal reasons.

From late in December until late in Feb-

ruary certain more or less fortuitous factors served to strengthen the market. The closing of navigation in Canada cut down supplies from this source, bad weather in the United States prevented the movement of grain in certain sections, and insufficient tonnage in Argentina curtailed shipments from there.[1] Consequently there was a gradual rise in prices—more pronounced in England than elsewhere because of her dependence on outside sources of supply[2]—until, with improvement in these conditions, the market weakened again under the volume of surplus supplies.

Price Comparisons. A comparison of prices in different markets[3] shows the very low level of Canadian prices during this period, especially after August 1923; the relatively close parity of United States winter wheat and Argentine wheat, in Kansas City and Buenos Aires respectively, until January, when the new Argentine crop came on the market and Argentine prices declined; and the high level of spring wheat prices in this country due to local scarcity of high-protein spring wheat and to tariff protection.

In the leading importing markets, London and Liverpool, no one type of wheat is uniformly cheaper or dearer than other types; the scarcity or abundance of the particular variety is the primary determinant of price relationships. During most of the past year, owing to the abundance of hard wheat[4] and the relative scarcity of good soft varieties, Australian and Pacific white wheat commanded a premium, while the best quality of Canadian wheat sold at lower prices. So long as good United States winter wheat was available for export, it was about on a parity with Argentine wheat, and both sold at a considerably lower price than other leading grades.

The seasonal character of prices of different types of wheat in the international market is also apparent. Immediately after the United States harvest last year, American winter wheat was relatively cheap in Liverpool. It rose sharply in October, and after the middle of November it ceased to be quoted. Similarly, when new Canadian wheat came on the market, it became especially cheap and remained the cheapest until the new Argentine crop came forward. Prices of Argentine wheat in Liverpool were not so low during the period of heaviest shipment—February, March, and April—as might have been expected, largely because of a special shortage of tonnage and the relatively high freight rates from Argentina to Europe. Nor did Australian prices decline during the heavy shipping season, in this case because of quality considerations.

A striking feature of the latter portion of this period was the high level of United States prices as compared with prices in other parts of the world. Hard spring wheat in Minneapolis was quoted at an average of 10 to 35 cents above quotations for similar wheat in Winnipeg, while the Chicago future quotation was usually several cents above the comparable price in Winnipeg or Buenos Aires. The primary reason for the high price of spring wheat here was the insufficiency of the crop to supply domestic needs. However, with an abundant crop of the same type of wheat just across the Canadian border this price could not have been maintained without the tarifff, which amounted, during most of this period, to 30 cents a bushel.

Continental Prices Subject to Special Influences. In continental markets prices of imported wheats fluctuate more or less

[1] See Appendix Table XIII for high freight rates existing at this period. Shortage of tonnage in Argentina at this time is reflected by the decline in shipments in the second half of February after the large seasonal movement had got under way. Following are the weekly shipments from Argentina and Uruguay for the 8 weeks from the middle of January to the middle of March, as reported by Broomhall:

Week ending	mil. bus.	Week ending	mil. bus.
Jan. 24	3.3	Feb. 21	4.9
Jan. 31	5.4	Feb. 28	4.3
Feb. 7	6.7	Mar. 8	5.9
Feb. 14	5.4	Mar. 13	5.2

[2] Port stocks were light in the United Kingdom at this time. Broomhall's weekly estimates ran as follows:

Week ending	mil. bus.	Week ending	mil. bus.
Jan. 22	6.4	Feb. 19	3.4
Jan. 29	5.6	Feb. 26	3.2
Feb. 5	5.2	Mar. 4	3.6
Feb. 12	4.2	Mar. 11	5.6

[3] See Appendix Table XVI and Chart 6 above.

[4] This applies to the world as a whole. In the United States there was a scarcity, as explained on page 37.

closely with similar prices in British markets, making allowance for rates of exchange, tariff duties, and freight charges. Prices of domestic wheat, however, while influenced by import prices, do not fluctuate in close accord with them. Imported wheat goes in large part to the big mills, many of them located at the ports, which supply much of the urban trade and practically all of the export flour. Domestic wheat is locally ground, to a considerable extent, and hence it is not always in direct competition with imported wheat. There are wide variations in prices of domestic wheat in different parts of each country, as in the United States, because of local surplus and deficiency areas and the transportation costs. The internal wheat markets are not highly organized, and even the quotations on large central markets are not regarded as truly representative.

Nevertheless, domestic prices on the Continent in 1923–24 deserve some consideration. Monthly average figures in leading markets in France, Italy, and Germany are shown in Appendix Table XVIII, first in the local currency and then in dollars converted at average monthly exchange rates on New York. It is clear that, on either basis, the movements were out of line with corresponding prices in British and overseas markets. Similarity lies chiefly in the fact that prices were relatively low in the earlier part of the year, and considerably higher at its close.

French wheat prices rose almost steadily until the middle of March; the average, 104.20 francs per quintal, was nearly 30 per cent above the average for August 1923, 81.10 francs. This rise was due primarily to the heavy depreciation of the franc, culminating on March 14, 1924, which led to a striking increase in import prices. There were, however, some other factors. Prices in August 1923 were exceptionally low, resulting from an exaggerated estimate of the domestic crop and from official statements that no imports from overseas would be required. The movement from the farms was so slow as to give rise to assertions that the peasants were holding for better prices; but early in 1924 it was generally agreed that the crop had been radically overestimated, and that domestic supplies had been largely marketed. After the recovery of the franc, domestic prices fell, primarily under the influence of the currency developments and the decline of import prices. Through the year as a whole, however, domestic wheat prices in France, in terms of dollars, ruled above British prices, except in January and February, when local prices were adjusting themselves slowly to the decline of the franc, and when the reduction in the import duty, by about 5 cents a bushel, exerted an influence.

In Italy prices were quite stable until December, but rose sharply from then until April. Here exchange fluctuations played only a small rôle, for the Italian lira was fairly stable at 4.3 to 4.5 cents. In the first four months there was a heavy marketing of native wheat, and imports, too, were heavy. Early in the year the domestic movement slackened greatly, so that prices of native wheat, which had been below import prices, rose above them. Some overestimation of the 1923 crop, and a considerable increase in local consumption, combined with a high degree of business activity, largely account for this rise. Toward the close of the year, prices declined slightly, in sharp contrast with the movement in international markets. Here, the chief influence was the coming of native wheat to market from the new crop, in June and July; for the seasonal tendency downward tended to counterbalance the upward movement in the international market.

In Germany, gold mark prices were fairly stable in the first three months of the year, though prices in paper marks rose strikingly. In November, gold mark prices rose nearly 40 per cent, under the combined influence of the breakdown of the process of domestic marketing and the economic crisis attending the substitution of a stable currency for the discredited paper mark. Within a few weeks, however, prices settled at a more normal level. In March and April a moderate rise occurred, as the severe unemployment diminished and confidence increased; but this was followed by a severe reaction, caused directly or indirectly by the heavy losses of flour importers who had

bought French flour on credit and were forced to liquidate their stocks to meet their commitments after the franc had risen in value.

During most of the year German wheat prices were below international prices, if both are expressed in dollars. Prices of many other commodities, as well as wheat, were out of line with international prices because of the restrictions upon trade between Germany and the rest of the world. While it is impossible to account fully for this situation, two factors doubtless contributed to cause it: consumption was low because of the exceedingly low purchasing power of the masses; and the domestic crop had been underestimated and the government reserves continued relatively large, so that producers marketed their wheat at a disadvantage.[1] In fact, late in the crop year, Germany actually exported some wheat and flour, though her per capita supplies were exceptionally small. It is also significant that Germany was in the best position to obtain cheap grain from Northern Russia.

To sum up: throughout most of the crop year, notably from September 1923 to May 1924, wheat prices in the principal exporting and importing markets were comparatively stable, and particularly so in Liverpool. The changes in the different exporting markets were occasioned largely by seasonal factors affecting harvests and transportation. Price movements in the United States were largely independent of international market prices, because domestic supplies of most wheats in demand for milling purposes were deficient and the tariff restricted imports of Canadian wheat. Prices of domestic wheat on the continent of Europe were subject to special influences in different countries,—notably exchange fluctuations in France, the financial crisis in Germany, and rapid consumption in Italy; hence these prices by no means paralleled the movements in international markets. While prices in terms of gold were characteristically low, the year showed a marked diversity in wheat prices in different markets of the world.

XI. MARKED CHANGES IN CLOSING MONTHS

By March and April the wheat market begins to feel the influence of new crop conditions in the Northern Hemisphere. It is then fairly apparent how the crops sown in the preceding autumn have wintered, and there are indications of the amount and condition of spring sowings, as well as of the probable harvests in Southern Europe and Northern Africa. On account of their importance in the export trade of the next few months, and their absolute size, the Canadian and United States crops are subject to special scrutiny, and weather and soil conditions in the two countries become increasingly important market considerations as the season progresses.

Early in the spring of 1924 the price situation, as already described, was decidedly unfavorable to producers. The official report of stocks on March 1 in the United States had shown a total of 288 million bushels, only 8 millions less than on the same date of the preceding year, although unofficial observers had anticipated a reduction of perhaps 40 million bushels.[2] Stocks on farms had been estimated unofficially at between 120 and 130 million bushels (as compared with 155 million the year before), but when the official report came out it disclosed a total of 134 million bushels.[3] The March 31 official report of Canadian stocks was even more unfavorable to selling interests,[4] showing a total of

[1] The representativeness of the quoted prices also may be called in question.

[2] Broomhall's *Corn Trade News*, March 4, 1924.

[3] The U. S. Dept. of Agriculture reported the reserve on March 1 as follows in millions of bushels:

	1923	1924
"Visible"	48	64
On farms	155	134
In mills and elevators	93	90
Totals	296	288

[4] Canadian stocks were officially reported on March 31 in millions of bushels as follows:

	1923	1924
Elevators	70	111
Flour mills	7	6
Transit by rail	8	14
Farmers' hands	55	71
Totals	140	202

202 million bushels as compared with 140 millions in the preceding year.

Other factors were also unfavorable to sellers. The Oriental demand had been largely filled by this time and the Japanese tariff was reimposed. The reopening of Canadian navigation would soon release the large supplies held through the winter at the head of the lakes. The financial position of the principal continental importers was uncertain, particularly in view of the French exchange crisis, which entailed severe reactions all over Western Europe, and the extreme financial stringency in Germany. The advance in the United States tariff on wheat on April 7, from 30 cents a bushel to 42 cents, had given no stimulus to the domestic market. Altogether, there was reason to expect another year of low wheat prices *provided* new crops turned out well.

During April, however, before much was known about the new crops, and owing mainly to the revival in continental buying that followed the striking improvement in the franc exchange, there was some improvement in the market. Mention has already been made of the fact that the 1923 crops had probably been overestimated in France, Italy, and other European importing countries, though not in Germany. By this time, in any case, their domestic reserves were low, and it had become necessary to increase imports of foreign wheat. The foreign trade figures show the pronounced increase that occurred, especially in the imports of France and Italy, in the second quarter of the year. (See Table 28.)

TABLE 28.—IMPORTS OF WHEAT AND FLOUR BY FRANCE, ITALY, AND GERMANY, JANUARY TO JULY, 1924

(Thousand bushels)

1924	France	Italy	Germany
Jan.	1,822	4,884	2,342
Feb.	1,877	3,777	3,060
Mar.	2,428	3,733	3,195
April	2,946	5,955	4,266
May	5,812	8,571	3,123
June	7,873	8,528	2,704
July	7,409	11,391	2,153

In Germany, on the other hand, imports declined from the high level of April because of the crisis among importers who were injured by the rise of the French franc, the financial obstacles to further imports, the availability of large government stocks of domestic grain, and the continuance of low consumption.

The advance thus started by the revival of European buying was supported by crop and weather factors. It was known that the acreage sown to winter wheat in the United States had been reduced by 6 million acres,[1] and it was anticipated that there would be a reduction in spring-wheat acreage in the United States and possibly in Canada. French and Italian acreage was also known to be somewhat less than in the preceding year,[2] and there were predictions that the Australian acreage might be reduced. Losses in these regions might be made up, at least in part, by increases in Argentina, Russia, and other parts of Europe, but there was not much likelihood of it.

By March it was also clear that the winter had been hard on the European crops; and as time went on it became apparent that the spring was cold and late. As early as April 1 Broomhall stated in the *Corn Trade News* that it was not unlikely that 1924 production would be below that of 1923. In the United States the fall-sown hard wheat had wintered well, but soft wheat had suffered from frost. The spring-wheat sowing was late in both the United States and Canada.

Continental buying continued in May on a generous scale, but crop factors came to play an increasingly important part in making the price. The May report of the United States Department of Agriculture was considered not unfavorable, since it showed an abandonment of only 3 million acres of winter wheat (about half that of the preceding year) and a probable production of 553 million bushels as compared with 572 millions in 1923.[3] Hard winter wheat was

[1] See Appendix Table III. From 46.1 to 40.2 million acres.

[2] Acreage planted to wheat:

	1923	1924
France	13,700,000	13,500,000
Italy	11,600,000	11,200,000

[3] See Appendix Table V.

in excellent condition; losses were anticipated in soft wheat. Late sowing in Canada and the reduction in spring-wheat acreage in the United States were more bullish factors, as was the drought that spread over northern Africa and southern Europe and Russia during this month.

By early June, European demand had declined somewhat and crop conditions appeared to have improved. The resulting slump in prices in all important markets during the first week of the month was followed, however, by a sharp advance on the publication of United States crop estimates as of June 1, which showed a decrease in the probable output of winter wheat amounting to 44 million bushels as compared with the May estimate, and to 63 millions as compared with 1923 production. Spring-wheat production was estimated at 184 million bushels as compared with 213 million in 1923.[1] On the basis of these forecasts the United States would harvest almost 100 million bushels less than in 1923, when the crop was not especially large.

Between this date and the end of the crop year there was a steady advance of prices, mainly because of crop news. The condition of the United States crops improved during the later growing season,[2] but the Canadian, Russian, and southern European crops deteriorated. The Canadian estimates were of special importance. In the first place, because of the late spring, there was a reduction of approximately 10 per cent in the acreage sown to spring wheat. The condition at the end of May was not so good as in 1923 but was considered not seriously unfavorable. By June 30, however, it was apparent that drought had done considerable damage, and the official estimate of the spring wheat crop was placed at 304 million bushels, as compared with the 1923 crop of 455 millions. In July dry weather caused further deterioration, with the result that the estimate made at the end of that month was placed at 263 million bushels, nearly 40 per cent less than the final production in 1923.[3]

[1] This figure was recently revised upwards to 225 millions. See Appendix Table V.

[2] See Appendix Table V.

[3] See Appendix Table VI.

The net result of these influences was a sharp up-turn in wheat prices, which extended to almost every market. Table 29 shows the amount of these changes, comparing prices early in August 1924 with those of early August 1923 and early June 1924. In the last two months of the crop year, wheat prices rose by some 20 to 46 cents a bushel, and on August 1 they stood 20 per cent or more above the level of late May and June. The new crop year opened with prices from 27 to 45 cents a bushel higher than in August, 1923. The rise was most pronounced in Canada, where prices had been exceptionally depressed and where the most striking change in crop appeared, and in the Argentine market, which is especially sensitive to changes in the international situation; but the rise in Liverpool was hardly less noteworthy. In the United States the rise was smaller because in June American prices were above world prices.

TABLE 29.—COMPARATIVE WHEAT PRICES IN LEADING MARKETS AT SELECTED DATES 1923–24

(Dollars per bushel)

Market and grade	First week of August 1923	First week of June 1924	First week of August 1924
United States			
Farm price	.84	.99 [a]	1.17 [a]
No. 2 Hard, Kansas City	.95	1.03	1.24
No. 2 Red, Chicago	.98	1.09	1.34
No. 1 Dark Northern, Minneapolis	1.21	1.29	1.52
Canada			
No. 1 Manitoba, Winnipeg	1.04	1.06	1.49
Argentina			
Barletta, Buenos Aires	1.01	1.03	1.46
Great Britain			
No.1 Manitoba, Liverpool	1.22	1.21	1.67
Argentina Rosafé, "	1.16	1.18	1.55
Australian, "	1.30	1.28	1.57
Pacific white, "	1.24	1.31	1.61

[a] Price of the 15th of the month.

In short, the close of the year was marked by a strong upward movement of wheat prices, which continued into the next crop year. The rise was initiated by heavy purchases by European importers. The major influence, however, was the prospect of late

and poor harvests in Europe and Russia, and greatly reduced yields in North America. Within a few weeks prices rose by 20 to 45 per cent; but so low had prices been that the recovery by August 1 was insufficient to raise prices in most countries to their pre-war level in relation to commodity prices in general.

XII. CONCLUDING OBSERVATIONS

It is now possible, in the light of the foregoing discussion, to answer the questions raised at the outset.

Wheat prices were exceptionally low throughout most of the crop year primarily because of large world crops of high quality. They fell no lower because at these low prices low-grade wheats were fed heavily to livestock, and unusual quantities were consumed as food, especially in Europe and the Orient. The striking rise at the close of the crop year was caused in the main by the prospect of poor crops in 1924, notably in Canada and Europe.

The exceptionally good crops of 1923 were attributable primarily to unusually favorable weather conditions in almost all producing areas except the United States, with resulting high yields per acre. In spite of better crops, Europe imported much more wheat than in 1922–23, chiefly because of relatively low wheat prices, but partly because of smaller potato crops and, outside of Germany, improved economic conditions. The exceptional demand from the Orient was due in part to poor rice crops, in part to the suspension of the Japanese tariff for several months, but in large measure also to the belief that wheat was an exceptionally good buy.

Russia, with crops insufficient to cover normal domestic requirements, made large shipments of bread grains, as a result of a ruthless export policy designed to facilitate purchase of essential imports even at the risk of shortage at home. The United States, with a large exportable surplus of wheat, imported some 27 million bushels of wheat from Canada, half of it over a duty of 30 to 42 cents a bushel, in order to make up a deficiency in hard wheats required for milling purposes.

American wheat farmers were exceptionally hard hit because in a year of bumper crops and low world prices, their crops cultivated at high costs, yielded low returns per acre, and because they had had two previous years of unprofitable production.

Most of the impressive features of the past crop year were more or less peculiar to it, whether one considers crops, movements, or prices. On the other hand, the upward trend in European acreage and production, the gradual improvement in economic conditions in Europe, the disorganization of Russia, and the tendency toward increased wheat-consumption in Italy and the Far East, are persisting factors, which nevertheless in any one year may be overshadowed by others of a more temporary character.

Viewing the year 1923–24 in retrospect, one is warranted in making a few other observations. The experience of the year indicates that within limits, when the value of wheat in relation to other commodities drops to a distinctly low point, there is considerable elasticity in the demand, both in exporting and in importing countries; and that for this reason there is, below a certain point, considerable resistance to further decline in prices. Had it not been for this surprising degree of elasticity of demand, wheat prices and values might have fallen in 1923–24 to much lower levels. This elasticity is afforded by the ready use of wheat as feed, which was furthered in several countries by relatively high prices for corn and potatoes, and by the ease of substitution in human diet.

Furthermore, exceptionally large crops of grain are likely to be absorbed during the year following the respective harvests, rather than stored up against future needs. Under peace conditions, variations in carry-over are not likely to be large enough to make a momentous difference in supplies. They are more significant as effects than as causes of price-changes. They are a smaller factor than annual variations in quality of crops and annual differences in harvest dates. In the past year there were exceptional reasons for increased carry-overs—low prices during much of the year, poor prospects for new crops; yet carry-

overs were increased but moderately. Under competitive conditions in the wheat trade, so-called surplus production will be currently absorbed, in the main; and, quite as truly, deficiencies in production as compared with the average will be met by resort to other foods and feeds.

The American wheat farmer's recent emergency is clearly ended. He suffered in 1923–24 because of a specially unfavorable combination of circumstances: the average quality of his crop was not high, and yields per acre, which are the dominant factor in cost per bushel, were low and costs per bushel relatively high, at a time when world prices were exceptionally depressed. This year the situation is reversed. American yields per acre are good; the wheat is of high quality; and world prices have definitely improved, largely in consequence of low yields of mediocre quality in Canada and Europe. This year, for the first time since 1919–20, the American wheat crop will be clearly remunerative to the growers. In many other countries the price advantage to growers will be largely or wholly offset by reduced yields and lower quality.

Undoubtedly an important factor in the recovery in the United States is the recent extensive reduction in wheat acreage here, resulting from unsatisfactory wheat prices for three years. With weather conditions such as this year's, an acreage as large as in 1921 might this year have yielded a crop some 160 to 200 million bushels larger than it actually was, perhaps sufficient to offset the decline in Canadian production and to prevent much of the price increase which has occurred. Or had there been no reduction in acreage, crops during the past few years would have been larger than they were, prices might all along have been still more depressed, and the recovery this year would have been to a distinctly lower level. Although the production of a larger acreage would have been remunerative at the prices of this year, the reduction in acreage has been well-advised, and there is danger in reversing the practice. There is as much reason to expect an early recurrence of the generally high yields per acre characteristic of 1923, as of the generally low yields of 1924.

While recent wheat prices have been abnormally low, there is no clear warrant, in history or statistics, for the prevalent assumption that the pre-war relation of wheat prices to the general level of prices should be and will be re-established. Textiles are a large element in the price indexes, and they have been notoriously high, chiefly in consequence of the high price of cotton. Coal also, in part for more temporary reasons, has been high. Because of higher wage levels, incompletely offset by corresponding increase of productivity, goods requiring much labor in their production are also relatively high. Yet the production of corn, potatoes, and other farm produce was profitable in 1922–23 and 1923–24, despite the fact that farm prices for these products stood below the pre-war levels in terms of their purchasing power over goods in general. It is quite conceivable that, even in an average year, wheat may be a remunerative crop at a price which, in terms of goods in general, is lower than that of 1909–14. Canada, Argentina, and Australia, as well as Europe, seem altogether likely to cultivate increasing acreages at a profit at such prices, and prices at all higher bid fair to stimulate still further expansion of wheat acreage.

The trend of wheat production since the war is clearly upward, for the world as a whole. Especially in Europe and the Southern Hemisphere, this trend is pronounced. No rapid expansion, however, is in early prospect, in view of unfavorable conditions in Russia and the Danube basin, where the deficiency as compared with pre-war years is greatest. The 1923–24 crops were exceptionally large considering this trend; the 1924–25 crops promise to be definitely below the line of trend. Such a reversal has frequently occurred in the past, with pronounced effects upon prices and movements. The current year presents a number of striking contrasts to 1923–24. It is equally erroneous to consider it typical, and it is dangerous to reason too closely from one exceptional year to another.

APPENDIX

Tables Relating to Wheat Supplies, Movements, and Prices

NOTE: Figures for crop years, unless otherwise stated, relate to years ending July 31. Statistics for Southern Hemisphere acreage, crops, and yields per acre, are compared and combined with Northern Hemisphere statistics for the preceding harvest. Flour, where included with wheat, is converted on the assumption of 70 per cent extraction, except that Canadian official statistics convert flour at 75 per cent extraction and United States official statistics at 4½ bushels of wheat to a barrel of flour.

TABLE I.—WHEAT PRODUCTION, ACREAGE, AND YIELD PER ACRE IN PRINCIPAL WHEAT-PRODUCING AREAS, PRE-WAR AND POST-WAR*

(*A*) PRODUCTION (*million bushels*)

Area	Average 1909–13	1919	1920	1921	1922	1923	1924 a
World (ex-Russia)[b]	3,005	c	2,894	3,116	3,156	3,488	c
Northern Hemisphere[b]	2,725	c	2,544	2,740	2,802	3,062	2,728
Southern Hemisphere	280	301	350	375	353	426	c
United States	690	968	833	815	868	797	873
Canada	197	193	263	301	400	474	272
Europe (ex-Russia)	1,348	c	948	1,216	1,044	1,260	1,084
North Africa	92	75	63	106	70	107	84
India	352	280	378	250	367	369	364
Japanese Empire	32	41	41	39	38	37	36
Argentina	147	217	156	191	196	247	190 f
Australia	90	46	146	129	109	126	130 f

(*B*) ACREAGE (*million acres*)

Area	Average 1909–13	1919	1920	1921	1922	1923	1924 a
World (ex-Russia)[b]	195.7	c	206.8	213.7	216.8	219.4	c
Northern Hemisphere[b]	169.0	c	179.4	186.5	187.1	189.5	182.5
Southern Hemisphere	26.7	26.9	27.4	27.2[d]	29.7	29.9	c
United States	47.1	75.7	61.1	63.7	62.3	59.7	54.2
Canada	9.9	19.1	18.2	23.3	22.4	22.7	21.7
Europe (ex-Russia)	73.0	c	60.3	63.9	64.4	65.7	65.4
North Africa	7.9	7.7	7.6	7.7	7.6	8.5	8.2
India	29.2	23.8	29.9	25.8	28.2	30.8	30.9
Japanese Empire	1.8	2.2	2.2	2.2	2.1	2.1	2.1
Argentina	16.1	17.0	15.0	13.9	16.1	17.2	17.7
Australia	7.6	6.4	9.1	9.7	10.0	9.5	10.0

(*C*) YIELD PER ACRE (*bushels*)[e]

Area	Average 1909–13	1919	1920	1921	1922	1923	1924
World (ex-Russia)[b]	15.3	c	13.9	14.5	14.5	15.9	c
Northern Hemisphere[b]	16.1	c	14.1	14.6	14.9	16.2	14.9
Southern Hemisphere	10.5	11.2	12.8	13.8	11.9	14.3	c
United States	14.7	12.8	13.6	12.8	13.9	13.4	16.1
Canada	19.8	10.1	14.4	12.9	17.8	20.9	12.5
Europe (ex-Russia)	18.5	c	15.7	19.0	16.2	19.2	16.6
North Africa	11.7	9.6	8.3	13.8	9.3	12.6	10.2
India	12.0	11.8	12.6	9.7	13.0	12.0	11.8
Japanese Empire	18.2	18.7	18.8	18.3	18.0	17.7	16.9
Argentina	9.2	12.8	10.4	13.7	12.2	14.4	10.7
Australia	11.9	7.2	16.1	13.3	11.0	13.3	13.0

* Sources: U. S. Dept. of Agric., *Yearbook 1923* (for 1919 figures) and *Foreign Crops and Markets*.

a Figures for 1924 are revised to November 26, 1924. The United States figures are revised to December 16, 1924.

b The totals include all countries for which there are comparable data for the pre-war and post-war periods. The only large producing areas omitted are Russia, for which (present territory) the pre-war output is estimated at 736 million bushels, produced from 73 million acres; and China, including Manchuria. World totals include Mexico's production but not Mexican acreage.

c Data not available.

d The figure for Peru in this total, 213,000 acres, is from *The International Yearbook of Agricultural Statistics, 1923*.

e Computed from the total production and acreage of the areas named, using figures in thousands.

f Forecast.

TABLE II.—PRODUCTION OF RYE, CORN, POTATOES, AND RICE IN PRINCIPAL PRODUCING AREAS, PRE-WAR AND POST-WAR*

(*A*) RYE *(million bushels)*

Area	Average 1909–13	1919	1920	1921	1922	1923	1924 a
Northern Hemisphere[b]	1,014	c	603	840	848	912	776
United States	36	76	61	62	103	63	64
Europe (ex-Russia)	976	c	532	757	713	826	699
France	53 d	31	34	44	38	37	40
Spain	28	23	28	28	26	28	30
Germany	368 d	240	194	268	206	263	236
Czecho-Slovakia	64 d	33	33	54	51	53	46
Hungary	31 d	c	21	23	25	31	23
Poland	219 d	c	74	168	197	235	179

(*B*) POTATOES *(million bushels)*

Area	1909–13	1919	1920	1921	1922	1923	1924 a
United States	358	323	403	362	453	416	455
Canada	78	126	134	107	93	92	83
England and Wales	100	102	119	110	150	103	99
Netherlands	104	127	122	107	162	90	97
Belgium	108	104	83	72	145	89	c
France	489 e	313	428	305	465	350	c
Spain	113 f	101	108	102	109	96	c
Germany	1,374 d	761	1,024	961	1,494	1,117	1,336
Czecho-Slovakia	c	84	184	159	333	231	c
Poland	449 g	386	665	617	1,240	974	973

(*C*) CORN *(million bushels)*

Area	Average 1909–13	1919	1920	1921	1922	1923	1924
World	3,904	3,962	4,437	4,076	3,972	4,300	c
United States	2,712	2,811	3,209	3,069	2,906	3,054	2,437
Italy	103 d	86	89	92	77	89	98
Hungary	61 d	c	50	32	49	49	80
Jugo-Slavia	112 d	c	101	74	89	81	106
Bulgaria	26 d	c	21	16	16	27	19
Rumania	193 d	141	182	111	111	151	154
Argentina	192	224	259	230	176	277	c

(*D*) RICE *(thousand short tons of cleaned rice)*

Area	1909–13	1919	1920	1921	1922	1923	1924 a
World [h]	54,243	c	57,439	62,531	63,324	59,000	c
United States	330	583	723	522	575	470	473
Spain	150	206	197	178	187	165	150
Italy	323	331	307	321	316	354	374
India	32,072	35,821	30,981	37,223	37,147	31,694	c
Japan	7,894	9,553	9,925	8,668	9,533	8,713	9,120
Formosa	706	773	761	782	914	817	c
French Indio-China	3,666	3,266	3,142	3,966	3,888	3,500	c
Siam	2,724	3,430	3,329	3,112	3,500	----	c
Ceylon	238	244	240	247	261	148	173
Philippine Islands	583	1,044	1,124	1,282	1,341	1,351	c
Java and Madura	3,590	4,899	4,174	3,680	3,225	3,360	3,862

* Sources: U. S. Dept. of Agric., *Yearbooks*, chiefly 1923; and *Foreign Crops and Markets*. Data derived largely from official estimates reported to International Institute of Agriculture, supplemented or modified in certain instances by Department of Agriculture estimates or adjustments.

a Data for 1924 are preliminary, hence especially subject to change.

b This total includes every country in the Northern Hemisphere whose production is of any size, except Russia, for which the pre-war estimated output for present territory is 776,198,000 bushels. The Southern Hemisphere production is of minor importance, the pre-war average being about 2½ million bushels and 1923–24 probably less than 5 million bushels.

c Data lacking or incomplete.

d U. S. Dept. of Agric. estimate for present territory.

e Pre-war boundaries.

f Two-year average.

g Preliminary estimate for former Russian territory within 1923 boundaries.

h Exclusive of China, where a normal crop is around 30 million short tons. A prominent Chinese authority has estimated the 1923 crop at 25 million tons.

TABLE III.—UNITED STATES WHEAT ACREAGE PLANTED, ABANDONED, AND HARVESTED *

(Million acres)

Crop of	Winter Wheat			Spring Wheat	Total
	Planted	Abandoned	Harvested	Harvested	Harvested
Average 1909-13	32.1	3.71	28.4	18.7	47.1
1919	51.1	0.56	50.5	25.2	75.7
1920	44.9	4.85	40.0	21.1	61.1
1921	45.6	2.19	43.4	20.3	63.7
1922	49.8	7.42	42.4	20.0	62.4
1923	46.1	6.59	39.5	20.1	59.6
1924	40.2	3.85	36.4	17.8	54.2

* Sources: U. S. Dept. of Agric., *Yearbook 1923*, p. 603; *Crops and Markets*, 1924, supplemented by December 16 crop report.

TABLE IV.—UNITED STATES WHEAT CROP CONDITION ESTIMATES, PRE-WAR AND POST-WAR *

(Percentages of normal)

(*A*) WINTER WHEAT

Date	1909–13 average	1920	1921	1922	1923	1924
Dec. 1	88.7	85.2	87.9	76.0	79.5	88.0
Apr. 1	83.7	75.6	91.0	78.4	75.2	83.0
May 1	84.7	79.1	88.8	83.5	80.1	84.8
June 1	79.8	78.2	77.9	81.9	76.3	74.0
Harvest	79.1	79.7	77.2	77.0	76.8	77.9
Yield per acre	15.6 bushels	15.3 bushels	13.8 bushels	13.8 bushels	14.5 [a] bushels	16.2 [a] bushels

(*B*) SPRING WHEAT

June 1	94.4	89.1	93.4	90.7	90.2	82.3
July 1	78.2	88.0	80.8	83.7	82.4	81.9
Aug. 1	75.4	73.4	66.6	80.4	69.6	79.7
Harvest	74.9	64.1	62.5	80.1	65.1	82.3
Yield per acre	13.3 bushels	10.5 bushels	10.6 bushels	14.1 bushels	11.2 bushels	15.9 bushels

* Sources: U. S. Dept. of Agric., *Yearbook 1923*, p. 606; *Crops and Markets* (for 1924 data), supplemented by December 16 crop report.

[a] Note that yield per acre was greater than suggested by condition at harvest.

TABLE V.—UNITED STATES WHEAT CROP FORECASTS AND ESTIMATES, 1922–24 *

(Million bushels)

	Winter	Spring	Total
1922 Revised	587	281	868
1923 Apr. 1	572	----	----
May 1	578	----	----
June 1	581	236	817
July 1	586	235	821
Aug. 1	568	225	793
Sept. 1	568	220	789
Oct. 1	568	213	782
Dec. 1	572	213	786
Revised	572	225	797
1924 Apr. 1	549	----	----
May 1	553	----	----
June 1	509	184	693
July 1	543	197	740
Aug. 1	589	225	814
Sept. 1	589	247	837
Oct. 1	589	266	856
Dec. 1	590	283	873

* Sources: U. S. Dept. of Agric., *Weather, Crops and Markets; Crops and Markets* (supplemented by December 16 crop report).

TABLE VI.—CANADIAN SPRING WHEAT PRODUCTION FORECASTS AND ESTIMATES, 1920–24 *

(Million bushels)

Date	1920	1921	1922	1923	1924
May 31	262	298	341	323	[c]
June 30	271	293	326	349	304
July 31	250	273	304	361	263
Aug. 31	271	279	372	451	271
Oct. 31	274	314	373	448 [a]	251 [b]
Dec. 31	244	285	381	455	[c]

* Sources: Dominion of Canada Bureau of Statistics, *Monthly Bulletin of Agricultural Statistics*. The May 31 and June 30 figures were computed from estimated acreage and condition figures. The July 31 and August 31 figures are forecasts of production. The October 31 figures are provisional estimates of production, and the December 31 figures are final estimates. Winter wheat production is usually around 20 million bushels.

[a] Computed.

[b] Total estimate less August 31 estimate for winter wheat.

[c] Not available.

TABLE VII.—WHEAT SUPPLIES AND THEIR DISPOSITION IN LEADING EXPORT COUNTRIES *

(Million bushels)

(*A*) UNITED STATES:
CROP YEARS ENDING JUNE 30

	1909–14 5-yr. ave.	1921–22	1922–23	1923–24
Stocks, July 1	90.0	100.2	89.0	112.5
New crop	690.1	814.9	867.6	797.4
Imports	1.8	17.3	19.9	28.0
Available supplies	781.9	932.4	976.5	937.9
Exports of wheat	56.9	208.3	154.9	78.8
Exports of flour	48.1	71.1	67.0	77.6
Total exports	105.0	279.4	221.9	156.4
Seed requirements	72.4	93.2	89.3	78.5
Milled for consumption	507.6	470.8	552.8	496.1
Feed and waste				94.0
Total domestic use	580.0	564.0	642.1	668.6
Stocks, June 30	96.9	89.0	112.5	112.9
Population (millions)	94.4	108.5	110.0	111.4
Food and feed use per capita (bushels)	5.38	4.34	5.03	5.29

(*B*) CANADA:
CROP YEARS ENDING AUGUST 31

	1920–21	1921–22	1922–23	1923–24
Stocks, September 1	9.8	7.9	16.0	8.9
New crop	263.2	300.9	399.8	474.2
Imports	.6	.2	.4	.4
Available supplies	273.6	309.0	416.2	483.5
Exports of wheat	136.2	158.6	229.7	289.2
Exports of flour	31.0	35.5	49.8	54.0
Total exports	167.2	194.1	279.5	343.2
Seed requirements	40.7	39.2	39.8	38.0
Milled for consumption	39.5	37.0	40.9	42.2
Feed and waste	18.4	22.7	47.1	33.6
Total domestic use	98.6	98.9	127.8	113.8
Stocks, August 31	7.9	16.0	8.9	26.5

(*C*) ARGENTINA:
CROP YEARS ENDING DECEMBER 31

	1922	1923	1924
Stocks, January 1	29.4	10.7	0.6
New crop	191.0	195.8	247.0
Available supplies	220.4	206.5	247.6
Exported Jan. 1 to July 31	109.1	106.2	139.0
Exported Aug. 1 to Dec. 31	36.4	34.0	
Total exports	145.5	140.2	
Seed requirements	17.5	18.7	19.3
Consumption, feed, and waste	46.7	47.0	46.6
Total domestic use	64.2	65.7	65.9
Stocks, December 31	10.7	0.6	

(*D*) AUSTRALIA:
CROP YEARS ENDING DECEMBER 31

	1922	1923	1924
Stocks, January 1	7.0	6.0	10.0
New crop	129.1	109.3	125.5
Available supplies	136.1	115.3	135.5
Exported Jan. 1 to July 31	75.8	41.1	64.5
Exported Aug. 1 to Dec. 31	8.7	21.1	
Total exports	84.5	62.2	
Seed requirements	9.4	8.9	9.4
Milled for consumption	30.0	30.7	31.5
Feed and waste	6.2	3.5	3.5
Total domestic use	45.6	43.1	44.4
Stocks, December 31	6.0	10.0	

* Sources: (*A*) United States: Dept. of Agric., *Yearbook 1923*, pp. 614, 621, supplemented by additional figures from various sources for 1924.

(*B*) Canada: Dominion Bureau of Statistics, *Report on the Grain Trade of Canada*, 1922, p. 122, and 1923, p. 124, supplemented by *Monthly Bulletin of Agricultural Statistics*, April 1924, p. 2; *Canadian Grain Statistics*, September 12, 1924, pp. 12–14, October 3, 1924, p. 21; and *Monthly Report of Trade of Canada*, August 1923, pp. 48–50, March 1924, pp. 48–50, and August 1924, pp. 47–49. Figures for 1923–24 domestic use include certain approximations not yet covered by official estimates.

(*C*) Argentina and Australia: *Foreign Crops and Markets*, March 19, 1924, and September 24, 1924, supplemented by *International Crop Report and Agricultural Statistics*.

TABLE VIII.—BROOMHALL'S SUCCESSIVE ESTIMATES OF THE WHEAT POSITION, 1922–23, 1923–24 *

(Million bushels)

Crop year 1922–23	Available for export	Probable shipments	Importers' requirements		Crop year 1923–24	Available for export	Probable shipments	Importers' requirements	
			Europe	Ex-Europe				Europe	Ex-Europe
1922 Aug. 15	776	672	592	64	1923 Aug. 14	896	632	532	100
Sept. 19	800	672	592	64	Sept. 11	936	632	532	100
Oct. 3	800	704	640	64	Oct. 16	960	656	532	124
Nov. 7	816	720	640	80	Nov. 6	952	656	532	124
Nov. 28	808	720	640	80	Dec. 4	984	688	560	128
Dec. 19	840	720	640	80	Dec. 11	936	688	560	128
1923 Jan. 2	832	720	640	80	1924 Feb. 5	952	704	560	144
Jan. 30	872	720	640	80	May 13	1,004	764	620	144
Mar. 20	848	688	608	80	June 17	966	764	620	144
Apr. 10	848	696	608	88	June 24	1,000	768	620	148
Apr. 24	912	696	608	88					
June 19	888	696	608	88					
Net change	+112	+24	+16	+24	Net change	+104	+136	+88	+48
Actual shipments		676	586	90	Actual shipments		775	626	149

* Source: Broomhall's *Corn Trade News.*

TABLE IX.—BROOMHALL'S ESTIMATES OF INTERNATIONAL SHIPMENTS OF WHEAT, RYE, AND CORN, PRE-WAR AND POST-WAR *

(Million bushels)

(*A*) WHEAT, INCLUDING FLOUR: CROP YEAR APPROXIMATELY JULY 31

Export area	1909–14 5-yr. ave.	1919–20	1920–21	1921–22	1922–23	1923–24 a
North America	206.2	291.6	432.2	404.0	455.1	454.4
Argentina and Uruguay	82.1	259.2	63.8	118.3	138.3	174.4
Australia	54.5	85.9	82.1	110.8	47.8	77.9
Russia, Danube and Black Sea	224.7	------	1.6	5.6	6.9	36.0
British India	46.9	------	11.2	0.2	26.1	17.4
Other countries	8.0	------	------	8.1	2.1	15.1
Total	622.5	636.7	591.0	647.1	676.4	775.2 a
Destination						
Europe	540.8	587.5	541.7	546.7	585.9	626.5 a
Ex-Europe	81.7	49.0	49.5	100.4	90.5	148.7 a

(*B*) RYE, INCLUDING RYE FLOUR: CROP YEAR ENDING APPROXIMATELY JULY 31

Export area	1909–14 5-yr. ave.	1919–20	1920–21	1921–22	1922–23	1923–24
Russia and Danube	24.3	.03	1.3	.02	2.7	41.3
North America	.9	41.7	40.0	34.9	58.7	26.8
Miscellaneous	28.8 b	1.3	1.7	1.3	1.5	------
Total	54.0	43.0	43.0	36.2	62.9	------

(*C*) CORN: CROP YEAR ENDING APPROXIMATELY OCTOBER 30

Export area	1909–14 5-yr. ave.	1919–20	1920–21	1921–22	1922–23	1923–24
Atlantic America	26.7	4.5	88.9	144.5	46.5	11.3
Russia	20.9	------	------	------	------	------
Danube	41.6	9.2	33.0	10.0	6.2	41.0
Argentina	112.0	136.4	126.8	86.2	128.5	155.0
Miscellaneous	4.4	.4	4.2	10.1	16.8	10.7
Total	205.6	150.5	252.9	250.9	198.1	218.0

* Source: Broomhall's *Corn Trade News.*

a For 53 weeks.

b Chiefly Germany, which since the war has ceased to be a rye exporter.

TABLE X.—INTERNATIONAL TRADE IN WHEAT, INCLUDING FLOUR AS WHEAT, PRE-WAR AND POST-WAR *

(Million bushels)

(A) NET EXPORTS FROM PRINCIPAL EXPORTING COUNTRIES

Year ending July 31	United States	Canada	Argentina	Australia	British India	Roumania	Hungary	Bulgaria	Jugo-Slavia	Algeria and Tunis	Russia
1909-14 ave	110.2	96.0	84.7	55.1	49.8	54.62 a	43.14 a	11.26 a	d	4.50	164.5 a
1919-20	239.3	93.9	266.0	101.0	2.5	d	(.54) b	.05	d	2.58	d
1920-21	318.4	167.9	63.6	88.9	15.1	1.41	(.01) b	1.77	3.76	(6.90) b	d
1921-22	251.2	186.7	118.1	114.6	(13.8) b	3.51	9.40	4.52	3.90	5.54	d
1922-23	199.6	281.0	139.4	50.3	28.6	1.65	5.16	d	1.01	3.04	d
1923-24	126.8	348.2	172.2	85.6	20.1	2.54	16.79	d	5.24	10.34	23.2 g

(B) NET IMPORTS BY PRINCIPAL IMPORTING COUNTRIES

Year ending July 31	United Kingdom	France	Germany	Italy	Belgium	Netherlands	Switzerland	Spain	Portugal	Denmark
1909-14 ave	217.7	43.6 a	67.8 a	53.0 a	50.2	22.6	16.9	6.19	2.41	6.65 a
1919-20	212.9	88.1	d	79.8	29.8	18.7	11.9	17.16	d	1.61
1920-21	200.1	68.3	59.8	99.4	32.2	18.9	12.9	19.83	d	.35
1921-22	208.2	17.1	69.5	100.5	40.5	19.8	13.2	8.02	d	4.01
1922-23	211.9 e	45.6	37.5	115.7	39.5	23.9	16.6	(.19) c	d	6.28
1923-24	236.7 e	53.0	30.9	69.8	40.3	26.7	17.1	d	d	9.19

Year ending July 31	Sweden	Norway	Austria	Czecho-Slovakia	Poland	Latvia	Finland	Greece	Egypt	Japan
1909-14 ave	7.07	3.78	10.5 a	d	d	d	d	d	.02	4.1
1919.20	7.39	6.48	13.6	d	d	d	d	d	9.12	12.8
1920-21	6.61	3.85	14.6 f	18.3	d	.58	2.46	10.6	11.21	5.8
1921-22	3.85	5.17	19.0 f	11.6	1.20	.74	3.39	13.7	6.84	24.9
1922-23	8.78	6.90	13.4 f	10.3	2.52	1.11	5.12	17.3	7.68	14.5
1923-24	12.39	6.11	18.2 f	21.2	.97 h	1.29 h	5.12	18.8	8.54	80.3

* Sources: Official statistics, compiled in *International Yearbook of Agricultural Statistics, 1923,* and *International Crop Report,* September 1924.

a Data not comparable with those of post-war years because of boundary changes.

b Net imports. c Net exports. d Data not available.

e Including, for comparative purposes, Irish Free State imports of 6.4 million bushels from April 1 to July 31, 1923, and 16.3 million bushels for 1923–24.

f Data incomplete, because of territories occupied by foreign armies.

g Unofficial: Broomhall's estimate. h Nine months only.

TABLE XI.—INTERNATIONAL TRADE IN WHEAT FLOUR, PRE-WAR AND POST-WAR *

(Thousand barrels of 196 lbs.)

(A) NET EXPORTS FROM PRINCIPAL EXPORTING COUNTRIES

Year ending July 31	United States	Canada	Australia	Argentina	India	Roumania	Hungary	Bulgaria	Jugo-Slavia	Italy	France	Belgium
1909-14 ave	10,640	3,897	1,802	1,307	613	1,091 a	7,443 a	502 a	d	793 a	133 a	704
1919-20	22,153	6,445	5,872	3,254	620	(93) b	(105) b	10	d	(1,458) b	(3,136) b	(206) b
1920-21	13,666	6,688	2,281	353	835	150	(2) b	83	426	(123) b	66	2
1921-22	14,904	7,702	3,677	949	496	115	1,864	243	393	91	372	236
1922-23	14,457	10,956	4,081	842	538	294	1,137	d	164	394	478	(24) b
1923-24	17,019	11,957	5,221	1,771	709	d	2,333	d	344	1,508	320	412

(B) NET IMPORTS BY PRINCIPAL IMPORTING COUNTRIES

Year ending July 31	United Kingdom	Nether-lands	Denmark	Norway	Sweden	Germany	Austria	Czecho-Slovakia	Poland	Latvia	Finland	Greece
1909-14 ave	5,193	2,028	586 a	87	639	(1,827) ac	(115) ac	d	d	d	d	92 j
1919-20	7,226	110	252	72	385	d	1,914	d	d	d	470	661
1920-21	6,552	592	45	272	241	306 f	1,361	3,135	d	92	434	229
1921-22	7,560	560	555	34	457	62 f	1,811	2,130	115	103	724	148
1922-23	5,579 i	659	555	75	603	567 f	2,016	1,997	534	72	1,091	1,094
1923-24	2,951 i	1,287	453	274	635	4,189 f	2,616	3,584	207 h	32 h	1,098	1,300

* Sources: Same as for Table X. a, b, c, d, e, f, g, h See corresponding footnotes to Table X.

i From April 1, 1923, for territory excluding Irish Free State. j Average for calendar years 1909–13.

TABLE XII.—UNITED STATES WHEAT INSPECTED FOR EXPORT, YEARS ENDING JUNE 30, 1921–24 *

(Thousand bushels)

Class	1920–21	1921–22	1922–23	1923–24
Hard red spring	10,081 [a]	20,145 [a]	8,718 [a]	1,022 [a]
Durum	4,872 [b]	8,697 [b]	12,271 [b]	4,908 [b]
Hard red winter	132,701	78,477	51,654	19,640
Soft red winter	34,281	18,998	20,846	9,810
White (Pacific)	27,729 [c]	43,652 [c]	13,602	18,653
Mixed	68,615 [d]	18,963 [e]	25,047 [e]	5,435
Total above classes	278,279	188,932	132,138	59,648
Unclassified	14,989	19,389	22,813	19,145
Total wheat export	293,268	208,321	154,951	78,793

* Sources: H. C. Wallace, *The Wheat Situation*, p. 89; *Crops and Markets, Monthly Suppl.*, July 1924, p. 247; U. S. Dept. Agric., *Yearbook 1923*, p. 622.

a Imports of hard red spring wheat from Canada largely exceeded U. S. exports of hard red spring wheat, except in 1921–22. U. S. Dept. Agric., *Yearbook 1923*, p. 622.

b See notes *d* and *e*.

c Including mostly "Portland (Ore.) Chamber of Commerce type sample" wheat, as most white wheat was shipped prior to July 1, 1922.

d Including some 20,030,000 bushels of durum mixed with hard spring wheat. Most of the rest was mixed hard and soft winter wheats shipped through Gulf ports.

e Including about 70 per cent estimated as durum, in 1921–23, and probably at least as large a proportion in 1923–24.

TABLE XIII.—OCEAN FREIGHT RATES ON WHEAT AND CORN, YEARLY AVERAGES 1913 AND CROP YEARS 1921–24, MONTHLY AVERAGES 1923–24 *

(Cents per bushel)

Period	Canada to United Kingdom	New York to Liverpool	Northern Range to United Kingdom	Northern Range to Genoa	Northern Pacific to United Kingdom	La Plata down river to United Kingdom	Karachi to United Kingdom	Australia to United Kingdom
1913	8.3	5.8	8.0	11.9	25.7	10.6	12.2	20.4
1921–22	10.7	8.5	10.3	12.5	25.3	14.6	12.8	28.6
1922–23	9.2	5.5	8.0	11.0	22.2	14.3	15.4	23.6
1923–24	9.4	6.8	8.6	10.4	21.2	13.7	15.0	21.8
1923 August	7.4	4.3	7.1	9.4	21.7	11.6	14.5	19.8
September	7.6	4.6	7.1	9.9	21.1	11.6	14.4	21.1
October	9.4	6.0	8.3	11.0	22.2	10.5	14.7	22.4
November	10.4	8.1	9.0	10.7	22.0	10.7	15.4	22.9
December	9.2	7.9	8.7	10.5	22.0	12.4	15.5	23.2
1924 January	9.3	7.9	8.9	10.2	22.8	15.1	15.8	25.2
February	11.2	10.1	10.7	11.2	23.1	17.2	16.7	26.7
March	11.0	9.2	9.7	11.4	21.4	16.6	15.7	24.6
April	10.2	7.1	8.9	11.0	19.8	16.0	14.5	19.9
May	10.2	6.8	8.6	10.5	20.1	16.3	14.7	18.7
June	8.7	5.2	8.3	10.3	19.0	14.0	14.2	18.2
July	7.7	4.1	7.0	8.9	18.8	12.4	13.4	18.8

* Computed from weekly rates published by the International Institute of Agriculture in *International Crop Report and Agricultural Statistics.*

TABLE XIV.—BROOMHALL'S ESTIMATES OF VISIBLE WHEAT SUPPLIES ON AUGUST 1, 1919–24, COMPARED WITH PRE-WAR AND POST-WAR AVERAGES*

(Million bushels)

	1919	1920	1921	1922	1923	1924	1910–14 5-yr. ave.	1919–23 5-yr. ave.
United States—wheat								
East of Rockies	38.0	31.0	46.3	34.1	58.7	58.4	48.5	41.6
West of Rockies	1.7	3.0	2.2	1.6	3.9	4.1	1.8	2.5
Canada—wheat	7.8	7.6	8.7	19.1	13.9	31.3	10.2	11.4
U. S.—flour as wheat	8.0	8.7	7.7	7.4	10.7	9.6	8.5	8.5
Canada—flour as wheat	.2	.6	.2	.2	.2	.3	.6	.3
Total	55.7	50.9	65.1	62.4	87.4	103.7	69.6	64.3
Argentina	4.4	3.7	3.7	2.2	4.4	6.8	1.3	3.7
Australia	120.0 [a]	27.5	30.0	3.0	18.0	30.0	[b]	39.7
Total	124.4 [a]	31.2	33.7	5.2	22.4	36.8	[b]	43.4
United Kingdom—wheat	7.2	10.0	6.4	5.2	7.0	8.4	12.4	7.2
United Kingdom—flour as wheat	10.8	2.8	1.2	1.9	1.2	1.5	3.0	3.6
Afloat for United Kingdom	14.5	24.9	18.5	12.3	14.1	14.4	13.9	16.9
Afloat for Continent	20.4	39.9	28.8	22.3	18.2	15.2	12.3	25.9
Afloat for orders	33.7	11.4	10.6	14.3	6.7	12.2	9.0	15.3
Total	86.6	89.0	65.5	56.0	47.2	51.7	50.6	68.9
Grand total	266.7 [a]	171.1	164.3	123.6	157.0	192.2	[b]	176.5
Excluding Australia	146.7	143.6	134.3	120.6	139.0	162.2	120.4	136.8

* Source: Broomhall's *Corn Trade News.* [a] Exceptional figures due to Australian war stocks. [b] Data incomplete.

TABLE XV.—UNITED STATES WHEAT STOCKS (EXCLUDING FLOUR), JULY 1, 1919–24, COMPARED WITH PRE-WAR AND POST-WAR AVERAGES*

(Thousand bushels)

Year	Total	On farms	In country mills and elevators	Commercial visible (Bradstreet's)
1919	49,806	19,261	19,672	10,873
1920	110,254	49,546	37,304	23,404
1921	93,840	56,707	27,167	9,966
1922	81,457	32,359	28,756	20,342
1923	102,414	35,894	37,117	29,403
1924	103,728	30,696	34,435	38,597
1909–13 ave.	88,317	32,276	31,000	25,041
1919–23 ave.	87,554	38,753	30,003	18,798

* U. S. Dept. of Agric., *Yearbook 1923,* p. 614, with certain revisions and additions. Flour stocks, not included here, are estimated by the U. S. Dept. of Agric., in wheat equivalent (thousands of bushels) as follows: 1909-13 ave., 8,555; 1919, 7,402; 1920, 10,273; 1921, 6,651; 1922, 7,461; 1923, 10,049; 1924, 9,207. These figures are by no means comprehensive.

TABLE XVI.—CANADIAN WHEAT STOCKS, SEPTEMBER 1, 1919–24 *

(Thousand bushels)

Year	Total	On farms	In elevators	In transit	In flour mills
1919	[a]	2,149	3,305	[a]	[a]
1920	[a]	2,122	6,930	[a]	238
1921	13,727	2,144	4,831	6,032	720
1922	19,463	2,360	11,025	4,578	1,500
1923	11,750	1,441	5,051	2,758	2,500
1924	28,358	5,035	17,507	1,816	4,000

* *Canada Year Books,* and U. S. *Crops and Markets,* September 27, 1924. [a] Figures not available.

TABLE XVII.—AVERAGE CASH PRICES OF REPRESENTATIVE WHEATS IN LEADING EXPORTING AND IMPORTING MARKETS, MONTHLY, 1923–24*

(U. S. dollars per bushel)

Month	United States				Canada	Liverpool	Argentina	Liverpool		
	Average farm price (a)	No. 2 Red Winter (Chicago)	No. 2 Hard Winter (Kansas City)	No. 1 Dark Northern (Minneapolis)	No. 1 Manitoba (Winnipeg)	No. 1 Manitoba	Barletta (Buenos Aires)	Argentine Rosafe	Australian	Pacific White
1923 July	.95	1.00	.96	1.18	1.06	1.28	1.06	1.22	1.34	1.28
Aug.	.84	1.00	1.01	1.22	1.11	1.27	1.02	1.16	1.26	1.26
Sept.	.89	1.05	1.09	1.26	1.03	1.31	1.07	1.19	1.27	1.28
Oct.	.93	1.11	1.12	1.26	.97	1.23	1.09	1.21	1.28	1.26
Nov.	.95	1.06	1.09	1.20	.95	1.20	1.14	1.22	1.25	1.24
Dec.	.92	1.09	1.09	1.19	.91	1.19	1.06	1.19	1.24	1.24
1924 Jan.	.97	1.13	1.13	1.23	.94	1.24	1.00	1.18	1.23	1.25
Feb.	.98	1.13	1.11	1.27	.96	1.29	.98	1.20	1.26	1.28
Mar.	.99	1.09	1.09	1.27	.95	1.24	.98	1.20	1.27	1.24
Apr.	.96	1.06	1.04	1.26	.96	1.21	.99	1.18	1.25	1.24
May	.97	1.07	1.06	1.30	1.03	1.23	1.03	1.21	1.29	1.28
June	.98	1.15	1.08	1.36	1.12	1.29	1.12	1.23	1.31	1.36
July	1.06	1.26	1.17	1.46	1.35	1.46	1.27	1.42	1.43	1.48

* Sources: U. S. prices from U. S. Dept. of Agric., *Yearbook* and *Crops and Markets;* foreign prices from *International Yearbook of Agricultural Statistics* and *International Crop Report and Agricultural Statistics,* except Rosafé, which is from Broomhall's *Corn Trade News.* Prices converted to U. S. dollars on a weekly basis for a certain day of each week and then reduced to monthly averages.

a Prices for first of month in 1923 and 15th of month in 1924.

TABLE XVIII.—AVERAGE PRICES OF DOMESTIC WHEATS IN EUROPEAN MARKETS, MONTHLY, 1923–24*

Month	Great Britain	France (Chartres)	Italy (Milan)	Germany (Berlin)	Great Britain	France (Chartres)	Italy (Milan)	Germany (Berlin)
	s. d. per quarter	*francs per quintal*	*lire per quintal*	*gold mks. per quintal*	*U. S. dollars per bushel*			[a]
1923 August	43–3	81.10	91.00	13.88	1.24	1.25	1.07	.90
September	38–3	85.05	91.00	14.37	1.09	1.36	1.10	.93
October	38–4	85.70	91.50	13.84	1.08	1.39	1.12	.90
November	38–10	90.00	89.90	19.32	1.09	1.36	1.07	1.25
December	41–10	93.55	92.50	17.06	1.14	1.34	1.09	1.11
1924 January	42–7	96.03	98.50	15.89	1.13	1.22	1.16	1.03
February	46–6	99.95	102.90	16.05	1.25	1.20	1.22	1.04
March	46–4	104.20	112.75	16.76	1.24	1.33	1.31	1.09
April	45–3	92.25	112.88	17.36	1.23	1.55	1.36	1.12
May	46–11	92.50	112.90	16.20	1.28	1.46	1.36	1.05
June	48–5	97.65	111.62	14.49	1.31	1.40	1.32	.94
July	51–11	97.25	106.88	16.51	1.42	1.36	1.26	1.07

* Sources: Great Britain, London *Economist;* France, U. S. Federal Reserve Board; Italy, *International Crop Report and Agricultural Statistics;* Germany, *Wirtschaft und Statistik.*

a Conversions made at average exchange rates for the month.

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WHEAT STUDIES

OF THE

FOOD RESEARCH INSTITUTE

VOL. I, NO. 2 STANFORD UNIVERSITY, CALIFORNIA JANUARY 1925

CURRENT SOURCES CONCERNING WHEAT SUPPLIES, MOVEMENTS, AND PRICES

A SELECT LIST, WITH COMMENTS

FOREWORD

The study of wheat supplies, movements, and prices has become more and more a matter of concern to millers, bakers, and farming interests, as well as to bankers and agricultural economists. Any one who enters upon such a study encounters a vast amount of published material. This, however, is in varied and widely scattered sources, and the student finds it difficult to ascertain the best and most convenient sources, and to distinguish between the good, the poor, and the indifferent.

The Food Research Institute has encountered these difficulties in its own studies of wheat, and has felt that other students might profit by the experience it has gained.

The list here presented was originally prepared at the request of the head of a large milling company. It was circulated in mimeographed form to a number of students of wheat, in this country and abroad. With the aid of criticisms and suggestions thus obtained, the list and comments have been thoroughly revised. In its present form it therefore represents something approaching a consensus of opinion of many scattered students, in the trade, in government offices, and in academic circles. In several respects, however, its scope has been limited.

As the title implies, the bibliography is confined to sources of current information. Several valuable books on wheat, the publications of the Federal Trade and Tariff Commissions, and numerous scattered periodical articles, are not included. Nevertheless, the term "current" is necessarily used in a broad sense, and the effort to provide a serviceable list has led to the inclusion of certain sources not strictly periodical in nature. In this way the user is directed to sources whence information may be expected to emanate, whether it appears regularly or not.

The list is further restricted to the principal exporting and importing countries, except as other countries are covered in sources relating to the wheat situation in the world at large. Thus no specific references are given with respect to Russia, Hungary, the Balkan States, and North Africa, among exporting areas, and to Belgium, Holland, Scandinavian countries, Austria, China, and Japan, among importing coun-

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tries. Conceivably it may prove desirable and feasible, at a later date, to extend the present list to cover some or all of these areas.

Even within these limits, the list is selective. The principal sources of value, for the countries covered, are believed to be mentioned, but no attempt has been made to assemble a comprehensive list. In particular, no mention is made of a number of daily newspapers which regularly give space to the wheat situation, or of periodicals which occasionally contain valuable reviews and analyses. For obvious reasons, sources on the American situation are listed more completely than those relating to other countries.

For convenience, the sources listed are classified into four groups, relating, respectively, to the world situation, the United States, the other principal exporting countries, and the principal importing countries. Within each group official sources and unofficial sources are distinguished, and, in general, yearly, monthly, weekly, and daily sources are mentioned in that order.

With a view to overcoming certain difficulties presented by classification and arrangement, an index to the sources has been appended.

I. SOURCES CONCERNING THE WORLD SITUATION

(A) OFFICIAL

INTERNATIONAL INSTITUTE OF AGRICULTURE, Rome.

——*Yearbook.*

Published usually in August for the preceding calendar year. Assembles in convenient form official statistics of acreage, yield, production, and trade, as reported to the International Institute of Agriculture. Also prices and ocean freight rates from unofficial sources. Now published in both French and English in the same volume.

——*International Crop Report and Agricultural Statistics.* Monthly.

An especially valuable source for statistical data, chiefly official, and other information from all over the world, and for special studies, as well as for a monthly summary of crop conditions. Now divided into three sections: (I) Production; (II) Trade and Stocks; (III) Prices and Freights. Twice a year, in October or November, and in March or April, it contains summaries of the world's requirements and available supplies of cereals, which formerly appeared in *Documentary Leaflets.*

UNITED STATES DEPARTMENT OF AGRICULTURE, Washington, D. C.

——*Yearbook.*

Published usually in July for the preceding year. The statistical appendices are by far the most exhaustive collection of official statistics on agriculture in the United States, and there are few better compilations of international information on wheat. Contains the report of the Secretary of Agriculture and, frequently, articles of considerable value to students of wheat.

——*Foreign Crops and Markets.* Weekly.

This mimeographed publication has become progressively more valuable for its statistical compilations on crops, for news items and special articles on conditions in particular countries, and as an up-to-date source for import and export figures.

United States Department of Commerce, Washington, D. C. *Commerce Reports.* Weekly.

Of value for cable reports and articles by commercial attachés and special representatives abroad, and for occasional reviews by the Foodstuffs Division.

Department of Trade and Commerce, Ottawa. *Commercial Intelligence Journal.* Weekly.

Corresponds to *U. S. Commerce Reports.* Excellent for tariff information and articles on grain and flour trade in foreign countries.

(B) UNOFFICIAL

Broomhall's Corn Trade Year Book.

Appears at intervals of several years. The last was published in 1921, but a 1924 issue is announced. It contains convenient summaries of Broomhall's valuable compilations.

Sir James Wilson. *The World's Wheat.*

Since 1915 Sir James Wilson has been preparing, usually semi-annually, analyses of the world wheat situation. At first these were prepared for the International Institute of Agriculture. Starting with the publication of an article in the *Journal of the Royal Statistical Society* in May 1921, they have appeared in various forms. They are usually circulated in typewritten form to a limited list of correspondents, but sometimes are printed in pamphlet form (e. g., Northern Publishing Co., London, November 1922, October 1923) or in *Broomhall's Corn Trade News* (e. g., November 1921, March 1922). These analyses utilize official data, and center about the estimation of exportable surpluses and probable imports. They are prepared in a uniform manner from year to year, and are valuable as representing the judgment of a well-informed and experienced observer of the grain trade.

Economische—Statistische Berichten, Rotterdam. Weekly.

The importance of Rotterdam and Antwerp as importing and transit markets adds to the value of both the weekly review of the grain trade and the occasional articles by Jan Schilthuis, a leading member of the Rotterdam grain trade.

Economist, London. Weekly.

An excellent economic journal, valuable for occasional articles and special correspondence from various countries; also for portions of its annual "Commercial History and Review," published in February.

George Broomhall's Corn Trade News, Liverpool. Daily; Special American Edition, weekly.

"An Organ of the European Grain and Flour Trades." Recognized as the leading trade publication on wheat. Invaluable for news items from correspondents in all the important wheat producing and wheat importing countries and for originally compiled material on stocks, visible supplies, and international movements of wheat. Contains reports of freight rates and of prices in leading international markets. Estimates of exportable surpluses, probable shipments, and probable imports, revised at frequent intervals, are another distinctive feature. Its "Weekly Review of the Grain Trade" is well-informed and useful.

NOTE. In addition to the publications mentioned above, several of those mentioned below contain more or less information on the world situation. See titles and comments under Sections II–IV; in particular, Special Bulletins of the U. S. Department of Agriculture, Special Studies of the Foodstuffs Division of the U. S. Department of Commerce, *Northwestern Miller* (Minneapolis), *Report on the Grain Trade of Canada* (Ottawa), *Grain Trade News* (Winnipeg), *Prospettive Economiche* (Milan).

II. SOURCES CONCERNING THE UNITED STATES

(A) OFFICIAL

United States Department of Agriculture, Washington, D. C.

——*The Agricultural Situation.* Monthly.

A mimeographed summary of statistics on production, exports, and prices. Also contains short articles and comments on current agricultural problems.

——*Crops and Markets, Monthly Supplement.*

Contains the official crop reports, and monthly statistical summaries which include inspection of United States wheat for export, exports, wheat ground, and other useful items. Indispensable for the intelligent following of the wheat situation in the United States.

——*Crops and Markets.* Weekly.

Contains a good weekly summary of market conditions as well as short items of interest. Primary market receipts and several good price series are also included.

——*Weekly Weather and Crop Bulletin.*

The best source for information on weather conditions in the United States and their effect upon crops.

——Miscellaneous Mimeographed Material.

Includes crop reports, *Mid-Month Crop Notes,* and preliminary studies often subsequently published, with revisions, in bulletin form.

——Press Releases by the Grain Futures Administration, Chicago.

Contain information on future transactions at all contract markets in the United States, collected under the Capper-Tincher Act. Relate principally, of course, to future trading at Chicago.

——Special Bulletins and Publications; for example:

Bulletin No. 982, *Market Statistics,* by Carl J. West and Lewis Flohr. June 1921.

A very useful compilation of statistical items, some of which are not included in the *Yearbooks.*

Bulletin No. 1234, *Agricultural Survey of Europe: The Danube Basin*—Part I, by Louis G. Michael. April 1924.

A good summary of the recent situation in Southwestern Europe.

The Wheat Situation: A Report to the President, by Henry C. Wallace. Nov. 30, 1923.

An analytical discussion, with numerous analytical tables, largely reprinted in the 1923 *Yearbook.*

UNITED STATES DEPARTMENT OF COMMERCE, Washington, D. C.

——*Monthly Summary of Foreign Commerce.*

The official source for statistics of imports and exports.

——*Survey of Current Business.* Monthly.

Devoted largely to industry rather than to agriculture, but assembles some information on the milling industry and on the production of principal crops in the leading producing countries. Contains indexes of agricultural movements and some analytical articles.

——*Wheat Ground and Wheat Milling Products.* Monthly.

Mimeographed, preliminary statistics compiled by the Census Bureau from the results of questionnaires sent to millers. Valuable as showing rates of extraction and as an index of milling activity.

——*Exports of Grains and Flour from the Principal Ports of the United States to Foreign Countries.* Weekly.

A mimeographed publication, preliminary in nature. Designed to include only exports of United States grain and flour, but has not always succeeded in eliminating Canadian grain shipped from United States ports. Its value is impaired also by inaccuracies incident to speed in publication, and by the frequent omission of important groups of ports for considerable periods.

——*Imports of Wheat from Canada into the Principal Northern Border Ports.* Weekly.

Mimeographed and preliminary. Gives separately imports for consumption and imports under bond.

——Special Studies of the Foodstuffs Division, appearing as *Trade Information Bulletins,* supplements to *Commerce Reports;* for example, the valuable series on *World Trade in Agricultural Products,* of which the following concern wheat:

No. 1. *Distribution of Agricultural Exports from the United States,* by H. M. Strong. Jan. 2, 1924.

No. 2. *Methods of Merchandising Wheat in the Export Trade,* Part I, "Buying Wheat for Export," Feb. 4, 1924; Part II, "Selling American Wheat Abroad," Feb. 11, 1924. By Theo. D. Hammatt.

No. 3. *International Competition in the Production of Wheat for Export,* by Frank M. Surface and others. Mar. 17, 1924.

No. 4. *Transportation in Relation to the Export Trade in Agricultural Products,* by Roland M. Kramer. Apr. 14, 1924.

No. 5. *Foreign Import Duties on Wheat, Wheat Flour, Meat, and Meat Products,* by Frank W. Fetter and Henry Chalmers. June 2, 1924.

No. 6. *European Economic Conditions which Affect the Markets for Agricultural Products,* by H. B. Smith. June 2, 1924.

No. 7. *Financing Agricultural Exports from the United States,* by George W. Edwards. June 23, 1924.

No. 8. *Marketing Canadian Wheat,* by Theo. D. Hammatt. Aug. 11, 1924.

No. 9. *Relation Between Value and Volume of Agricultural Exports,* by H. M. Strong. October 1924.

(B) UNOFFICIAL: (1) ANNUALS

Chicago Board of Trade. *Annual Report.*

Of value for rules, by-laws, and regulations of the Chicago Board of Trade, as well as for a number of statistical items, the most valuable of which are the "Daily Current Prices at Chicago for the Leading Speculative Articles." Extends over a long period of years.

Howard, Bartels & Co. *"Our Red Book": Statistical Information Relating to Stocks, Cotton, Grain, Provisions, Live Stock, Seeds, Crops, Imports, Etc., of Principal Countries,* Chicago.

A serviceable compilation of statistical information.

Miller's Almanack and Year Book. The Northwestern Miller, Minneapolis.

A useful handbook with considerable information regarding wheat and especially the flour trade, covering a series of years.

New York Produce Exchange. *Annual Statistical Report.*

A convenient source for statistical data, especially those on prices at New York.

Price Current-Grain Reporter Year Book, Chicago.

A serviceable compilation of grain trade statistics.

(B) UNOFFICIAL: (2) MONTHLY OR OCCASIONAL PUBLICATIONS

Clement, Curtis and Company, Chicago. Monthly circulars.

Contains estimates and analyses of Nat C. Murray, formerly Chief Statistician of the Bureau of Crop Estimates, U. S. Department of Agriculture, and useful notes on the wheat situation.

Bartlett-Frazier Company, Chicago. Occasional.

These are very instructive articles on various aspects of the grain trade. Unfortunately they appear irregularly, often at long intervals.

(B) UNOFFICIAL: (3) WEEKLY PUBLICATIONS

Bradstreet's, New York.

"A Journal of Trade, Finance, and Public Economy." The original source of "Bradstreet's Commercial Visible Supplies of Grain," for the United States and Canada. Reports Broomhall's statistics of movements, often inaccurately, as received by cable.

Commercial Review, Portland, Oregon.

The best source for information on crops, movements, and prices in the Pacific Northwest.

Modern Miller, Chicago.

One of the best milling trade journals; also contains considerable material on wheat.

Northwestern Miller, Minneapolis.

The leading American journal of the milling industry. It contains valuable articles on wheat and flour, as well as useful tables, among which may be mentioned those of flour and millfeed prices, flour output, and milling activity. Of considerable value are the departments conducted by correspondents in the important milling regions of the United States, Canada, and Europe.

Price Current-Grain Reporter, Chicago.

One of the more useful grain trade journals, covering Chicago futures transactions, wheat receipts at principal primary markets, Bradstreet's visible, and a review of the grain situation from the trade point of view. Makes Broomhall's figures for world shipments available in the United States before the American edition of the *Corn Trade News* is received.

Russell's Commercial Review, New York.

Prepared by A. L. Russell, formerly statistician for the U. S. Grain Corporation. Especially valuable for estimates of the wheat position in the United States.

Van Dusen Harrington Company, Minneapolis.

Mimeographed reports of crop conditions, mainly in the Northwest, by W. G. Hudson.

(B) UNOFFICIAL: (4) DAILY PUBLICATIONS

Daily Market Record, Minneapolis.

The best daily market paper for information on the Minneapolis and Duluth markets.

Daily Trade Bulletin, Chicago.

The last edition is one of the best sources for day-to-day prices, movement, inspections, etc.

Kansas City Grain Market Review.

A good source for daily information on the Kansas City market.

Market News, New York City.

A daily bulletin published by Russell's Commercial News, Inc. Chiefly devoted to prices.

III. SOURCES CONCERNING OTHER PRINCIPAL WHEAT EXPORTING COUNTRIES

1. CANADA

(A) OFFICIAL

Dominion Bureau of Statistics, Ottawa.

——*Canada Year Book.*

Contains considerable information on agriculture and weather in Canada.

——*Report on the Flour Milling Industry in Canada.*

Annual reports, usually appearing in mimeographed form, and published approximately two years after the year to which they refer.

DOMINION BUREAU OF STATISTICS, Ottawa (Concluded).

——*Report on the Grain Trade of Canada.* Annual.

Covers practically every phase of the production and distribution of wheat in Canada. Includes some very good tables of an international character. No other country possesses so excellent a statistical summary of the production and distribution of its cereal crops.

——*Canadian Milling Statistics.* Monthly.

A mimeographed preliminary statement of mill grindings and flour production. The same information is included in *Canadian Grain Statistics.*

——*Monthly Bulletin of Agricultural Statistics.*

The standard source for official information on Canadian weather and crops, prices, visibles, wheat in store, and inspections.

——*Monthly Report of the Trade of Canada.*

The official source, giving full statistics of imports and exports.

——*Canadian Grain Statistics.* Weekly.

The best current source for weekly statistics of wheat stocks and internal movement, and for monthly statements of mill grindings and trade by country of destination.

(B) UNOFFICIAL

Canadian Grain Trade Year Book. W. Sanford Evans Statistical Service, Winnipeg.

A good commercial compilation of statistical items on the Canadian grain trade. Especially useful for its series of Winnipeg daily prices.

WINNIPEG GRAIN EXCHANGE. *Annual Report.*

A convenient reference for information on Canadian prices and crops.

LAKE SHIPPERS CLEARANCE ASSOCIATION, Winnipeg. *Monthly Statement.*

A statistical statement of shipments of grain from Fort William and Port Arthur, by both rail and water.

Grain Trade News, Winnipeg. Weekly edition.

An exceptionally good trade paper, controlled by W. Sanford Evans, a competent and experienced student of wheat. Valuable for its editorials and articles as well as for crop information and statistical compilations. Contains an interesting section on "The World's Grain Trade."

W. Sanford Evans Statistical Service, Winnipeg. Daily, weekly, and monthly.

Probably the most ambitious statistical service in the grain trade. To a large extent, however, consists of convenient compilations of the very complete Canadian official figures. The supplementary material is well chosen and well presented.

Manitoba Free Press, Winnipeg. Daily.

A daily newspaper, useful for Winnipeg prices, etc.; worthy of special mention because of the excellent crop estimates and reports of Miss E. Cora Hind and its periodical reviews of the wheat situation.

2. ARGENTINA

(A) OFFICIAL

MINISTERIO DE AGRICULTURA, Buenos Aires. *Estadistica Agro-Pecuaria.* Monthly.

The official source for information on Argentine crops, exports, and prices.

(B) UNOFFICIAL

ERNESTO TORNQUIST & COMPANY, Buenos Aires. *Business Conditions in Argentina.* Quarterly.

A general review of business conditions bearing directly and indirectly on the grain situation.

Review of the River Plate, Buenos Aires. Weekly.

The grain trade is allotted little space in this general business journal. Occasionally, however, information is given which is not available elsewhere. A convenient source for export duties, which vary from month to month.

The Times of Argentina, Buenos Aires. Weekly.

Valuable for current news on the Argentine wheat trade.

3. AUSTRALIA

(A) OFFICIAL

COMMONWEALTH BUREAU OF CENSUS AND STATISTICS, Melbourne.

——*Official Year Book of the Commonwealth of Australia.*

The best single source for information on Australian crops, exports, and prices. Also contains estimates of consumption and seeding requirements.

——*Quarterly Summary of Australian Statistics.*

The official source for current information on crops and trade. Rarely received in the United States until six months or more after the last month to which it refers.

4. INDIA

(A) OFFICIAL

COMMERCIAL INTELLIGENCE DEPARTMENT, Calcutta.

——*Estimates of Area and Yield of Principal Crops of India.* Annual.

The official statement regarding area and production of crops.

——*Monthly Accounts of the Foreign Sea-Borne Trade and Navigation of British India.*

The official source of export and import statistics.

——*Indian Trade Journal.* Weekly.

Contains up-to-date information on crops and crop conditions, and weekly statistics of trade.

IV. SOURCES CONCERNING THE PRINCIPAL WHEAT IMPORTING COUNTRIES

1. GREAT BRITAIN

(A) OFFICIAL

Accounts Relating to Trade and Navigation of the United Kingdom, London. Monthly.

The official publication of import and export statistics.

(B) UNOFFICIAL

The Miller, London. Weekly and monthly.

A good trade journal, largely technical in nature.

Milling, Liverpool. Weekly.

A Broomhall publication. Contains material reprinted from the *Corn Trade News,* with considerable additional information on the British flour trade.

London Corn Circular. Semi-weekly.

Especially good for information on the spot grain trade.

London Grain, Seed and Oil Reporter. Daily.

An excellent periodical covering international relations as to grains and oil seeds.

2. GERMANY

(A) OFFICIAL

Monatliche Nachweise über den Auswärtigen Handel Deutschlands, Berlin.

The official source for import and export statistics.

Wirtschaft und Statistik, Berlin. Semi-monthly.

Although this publication deals more especially with industry and economic conditions in general, it is worthy of mention as a convenient official source as to plantings, condition, production, trade, and prices, as well as for occasional analytical articles.

(B) UNOFFICIAL

Deutsche Landwirtschaftliche Presse, Berlin. Weekly.

A leading agricultural journal, containing a weekly review of the grain trade, reports of crops, and articles on agricultural questions.

Berichte der Preisstelle des Deutschen Landwirthschaftsrats, Berlin. Daily.

Original trade material.

Berliner Tageblatt, Berlin. Daily.

Deutsche Tagezeitung, Berlin. Daily.

Two reliable newspapers, frequently containing valuable special articles by agricultural economists. Their news items and editorials, as a rule, reflect industrialists' point of view.

Marktbericht Hansablum, Hamburg. Daily.

The importer's viewpoint.

3. FRANCE

(A) OFFICIAL

Bulletin de la Statistique Générale de la France. Quarterly.

Valuable especially for prices of grain, flour, and bread.

Documents Statistiques sur le Commerce de la France, Paris. Monthly.

The official source of import and export statistics.

Bulletin de l'Office de Renseignements Agricoles, Paris. Semi-monthly.

Contains statistics of area and production of crops, as well as official decrees and orders relating to agriculture.

(B) UNOFFICIAL

Almanach du Blé, Paris. Annual.

Contains very instructive articles on the French grain trade.

La Meunerie Française, Paris. Monthly.

An excellent milling journal, close to the international situation. Contains valuable articles on the French milling industry.

Tablettes Statistiques et Documents Législatifs et Administratifs. Monthly.

Pamphlets devoting considerable space to cereals, and valuable for price series covering preceding years.

Bulletin des Halles, Bourses et Marchés, Paris. Daily.

Comprehensive assembly of prices, with frequent reviews of the agricultural situation.

4. ITALY

(A) OFFICIAL

Notizie Periodiche di Statistica Agraria, Rome. Monthly.

The official source for statistics of acreage, production, and prices.

Statistica del Commercio Special di Importazione e di Esportazione, Rome. Monthly.

The official source of import and export statistics.

(B) UNOFFICIAL

Giorgio Mortara. *Prospettive Economiche,* Milan. Annual.

Published early in the year. An excellent source of information on the Italian situation with regard to wheat and wheat substitutes. Also contains a good discussion of the international situation.

Bolletino di Notizie Economiche, Rome. Monthly. Edited by Professor Felix Guarneri.

Excellent and unusual material, chiefly on industry, trade, and finance. Contains several wheat price series, but does not attempt to cover agricultural statistics.

Listino Ufficiale della Borsa Merci, Genoa. Weekly.

Published by the Chamber of Commerce and Industry.

Il Sole, Milan. Daily.

A valuable commercial newspaper.

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WHEAT STUDIES

OF THE

FOOD RESEARCH INSTITUTE

STANFORD UNIVERSITY, CALIFORNIA

The series is designed to give a sound, impartial review of the world wheat position and outlook, based upon careful analysis of the various elements in the situation, with due recognition of economic conditions in exporting and importing countries. The material is presented in a form easily read and understood, and convenient for reference. Surveys of brief periods will appear at intervals. Intensive studies of particular elements in the wheat situation will be included from time to time. Selected statistical data will be printed in appendices to the various issues.

Volume I, running from December 1924 to September 1925, will include at least ten issues. The following issues have appeared:

No. 1. *The World Wheat Situation, 1923–24: A Review of the Crop Year.* [Single copy, price $2.00.]

No. 2. *Current Sources Concerning Wheat Supplies, Movements, and Prices: A Select List, with Comments.* [Single copy, price $1.00.]

Subsequent issues will include the following:

Developments in the World Wheat Situation, August to December, 1924
The Dispensability of a Wheat Surplus in the United States
Canada as Wheat Producer and Exporter

WHEAT STUDIES is published by Stanford University, California, for the Food Research Institute, at a subscription price of $10.00 for Volume I, beginning December 1924. A binder for use with current issues will be furnished to each regular subscriber. Single copies are separately priced.

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WHEAT STUDIES

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FOOD RESEARCH INSTITUTE

VOL. I, NO. 3 STANFORD UNIVERSITY, CALIFORNIA FEBRUARY 1925

DEVELOPMENTS IN THE WHEAT SITUATION AUGUST TO DECEMBER, 1924

I. CHARACTERISTICS OF THE PERIOD

The crop year 1924–25 is exhibiting marked contrasts to that of 1923–24. World crops of wheat and rye are small, instead of exceptionally large, and even more deficient in quality than in quantity, though American wheat growers were blest with excellent yields. Crops of important substitutes, except potatoes and rice, are short. The intensity of Europe's effective demand for imports is increased by improvement in her economic and financial position. Whereas last year wheat supplies were so abundant that demands were easily met, this year requirements are fulfilled from available supplies only with difficulty. This situation, which was partially realized toward the end of the last crop year, has become increasingly evident. The result has been a remarkable rise in wheat prices, amounting to more than 50 per cent from May to December, when the rise had not yet reached its culmination. The increase is the more pronounced because for several years wheat prices had been abnormally low.

Characteristics of the Period
The Unfavorable Supply Situation
Importers' Requirements
Exports and Exportable Surpluses
The Upward Course of Prices
Concluding Observations

A notable feature of the period has been the phenomenally rapid marketing of the large American crop. Under the pressure of farm indebtedness, much of it overdue or unfunded, even the prices of the summer and early autumn were temptingly high. Under these circumstances, farmers followed to an unusual degree their customary practice of heavy autumnal marketing. The Grain Marketing Company openly encouraged this rapid marketing, despite much discussion, in recent years, of the advantages of "orderly marketing" of wheat. In Canada, on the other hand, the wheat pool influence has apparently been in the direction of slower marketing. Largely because of insistent European demand and rapid marketing in the United States, the international movement from August to December was exceptionally heavy, amounting to nearly 50 per cent of supplies available for export for the year.

The full effects of the price increase have not yet been felt by consumers; but already, in Europe in particular, governmental investigations are the order of the day. In almost every country measures have been taken to deal with the problem, and more are seriously under discussion. If the situation is to be wisely met, it is highly important that it should be understood.

The time is ripe for a review of the developments of the first five months of the crop year and an appraisal of the position at the turn of the year, and for a consideration of

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the outlook. Northern Hemisphere crops have been harvested, largely threshed, and in large measure marketed. The Southern Hemisphere crops are harvested. In the Northern Hemisphere fall sowings have been completed for the 1925 crop. Exports for the first five months of the year are known. The financial and psychological elements in the situation are fairly clear. While there are still many uncertainties in the position and outlook, these are illuminated by a survey of the recent period. Such a survey, covering supplies, importers' requirements, exports and exportable surpluses, and the movements of prices, is undertaken in the following discussion.[1]

II. THE UNFAVORABLE SUPPLY SITUATION

The principal cause of the notable increase in wheat prices is found in the supply situation. Last year, weather conditions were almost universally favorable, except in the United States. This year, they were almost as universally unfavorable, except in the United States, India, and Australia. The change has affected quality as well as quantity, and other leading crops as well as wheat. The result is a small world wheat crop, of low average quality, in a year when wheat substitutes are also deficient in supply.

Crop Developments, June to December

Throughout the last six months of 1924 there was considerable uncertainty regarding the size of the crops. Broadly speaking, however, the December world-crop estimates are fully as large as was forecast last June. The United States crop, forecast on June 1 as 693 million bushels, was officially estimated on December 1 at 873 millions, an increase of 180 millions.[2] In most other countries the changes in forecasts were downward, in the aggregate about enough to offset the increase in the United States crop. Thus the Canadian outlook became worse in June, when the American outlook brightened most, and subsequent reductions in Canadian estimates, from June 30 to December 31, amounted to 64 million bushels.[3] The Argentine crop matured under conditions less favorable than the average, and has turned out about 35 million bushels less than post-war average yields would have given. On the other hand, the Australian crop improved by about an equal amount. Early in the season Russia was expected to have a small export surplus, but later developments removed this possibility. Developments in Hungary and the Balkan States also reduced the only moderate expectations from the Danube basin. The French crop turned out somewhat larger than had been anticipated, but in many other countries of western and central Europe the harvests were smaller than forecasts had indicated. The Indian crop, though of good size, also proved inferior to early estimates by some 20 million bushels.

On the whole, therefore, the harvest season, instead of showing improvements in quantity, bore out the pessimistic forecasts of the late spring. The deterioration in quality was greater than was anticipated in June. The net result was a large volume of tail wheat and of grain which, though millable, would yield much less than the normal amount of flour.

World Wheat Supplies Small and of Poor Quality

Table 1 summarizes the world wheat supplies for the crop year 1924–25, according to the latest estimates, in comparison with figures for the four previous years and the five-year pre-war average. Statistics for Russia are excluded partly because they are unsatisfactory, partly because the Russian crops since the war have had little significance for the rest of the world. The table indicates a net reduction of some 380 mil-

[1] Frequent reference in the course of this study is made to the text and the appendix tables in Wheat Studies, No. 1, December 1924: "The World Wheat Situation 1923–24—A Review of the Crop Year," which furnishes an essential background for the survey of recent months.

[2] See Wheat Studies, No. 1, Appendix Table V.

[3] *Ibid.*, Appendix Table VI. The December 31 figure was 240 million bushels.

lion bushels below the bumper yield of 1923. Important decreases in Europe, Canada, and Argentina were partially offset by increases in the United States and Australia.[1]

The decline in production this year is due in part to a reduction of about 5 million acres in harvested area. This is largely accounted for by the decrease in United States acreage. Increases in Argentina and Australia more than offset the decline in Canada, and changes elsewhere were small.[2] Much more largely it was due to reduction in yield per acre, except in the United States, Australia, and France. The improvement in yield in the United States, however, so far offset decreases elsewhere that for the world wheat-producing areas as a whole the 1924 average yield was almost as good as the average of the first five post-war years, and was materially exceeded by no post-war year except 1923. Table 2 illustrates this point.[3] In short, so far as quantities are concerned, the comparison with bumper yields of 1923 exaggerates the inferiority of this year's crops.

Indeed, Table 1 brings out clearly the striking fact that the world wheat supplies during the present season are about the same as in 1921–22 and only a little smaller than in 1922–23, whereas wheat prices are much higher. It is important to examine the causes of this change. Except for the Canadian and Australian situation, the distribution of supplies this year, one observes, is much the same as it was two years ago. The wheat carryover is not responsible; it is never large enough to influence world prices strongly, and on the whole it was larger at the opening of this crop year than in 1921–22 or 1922–23. The following differences, however, help to explain the striking dissimilarity of prices:

(1) The quality of wheat in the present season in Europe and in Canada is much lower than it was two or three years ago. If, as is currently estimated, one-sixth of the crop of Europe and one-third of the crop of Canada are of distinctly inferior quality, the millable crop of 1924 is considerably less than the millable crop of 1922, though the quality of that crop in Europe was by no means high. This fact has contributed to the retardation of export from

TABLE 1.—WHEAT PRODUCTION IN PRINCIPAL WHEAT-PRODUCING COUNTRIES, PRE-WAR AND POST-WAR*

(Million bushels)

Year Average	World (ex-Russia)	Europe (ex-Russia)	United States	Canada	British India	North Africa	Japanese Empire	Argentina	Australia
1909–13	3,005	1,348	690	197	352	92	32	147	90
1920	2,894	948	833	263	378	63	41	156	146
1921	3,116	1,216	815	301	250	106	39	191	129
1922	3,156	1,044	868	400	367	70	38	196	109
1923	3,499	1,262	797	474	369	107	37	257	126
1924	3,120[a]	1,082	873	262	364	84	36	191	162

* Source: *Foreign Crops and Markets.*
[a] Estimated by allowing about 50 million bushels for Southern Hemisphere other than Argentina and Australia.

TABLE 2.—WHEAT YIELD PER ACRE IN PRINCIPAL WHEAT-PRODUCING AREAS, 1924, WITH COMPARISONS*

(Bushels)

Area	1909–13 average	1919–23 average	1923	1924
World (ex-Russia)	15.3	14.7[a]	15.9	14.5[b]
Northern Hemis.	16.1	14.9[a]	16.1	14.8
Southern Hemis.	10.5	12.9	14.6	12.4[b]
United States	14.7	13.3	13.4	16.1
Canada	19.8	15.2	20.9	12.1
Europe (ex-Russia)	18.5	17.5[a]	19.2	16.4
North Africa	11.7	10.7	12.6	10.2
India	12.0	11.8	12.0	11.8
Japanese Empire	18.2	18.3	17.7	16.9
Argentina	9.2	12.8	14.9	10.8
Australia	11.9	12.2	13.2	15.0

* Computed from the total production and acreage of the areas named.
[a] Average of 4 years, 1920–23.
[b] Southern Hemisphere yield is based on Argentina and Australia.

[1] There are still possibilities of revisions in estimates, and these revisions may conceivably be large enough, in this year of close adjustment between supplies and requirements, to affect the general position.

[2] See WHEAT STUDIES, No. 1, Appendix Table I (*B*). The Australian wheat area is now estimated at 10,775,000 acres.

[3] See also *Ibid.*, Appendix Table I (*C*).

Canada, to the acceleration of export from the United States, and to the somewhat panicky autumnal import into Europe.

(2) The situation in wheat is intensified by the position of rye. The world rye crop and the exportable surplus are the poorest since 1920. The rye crop of Europe, ex-Russia, is 164 million bushels less than last year; the bread-grain crop is 344 million bushels less than last year. Adding to the 164 million bushels the amount of rye received by Europe from Russia last year, the rye deficit is over 200 million bushels, to be covered by wheat or coarse grains. This obviously reinforces the influence on wheat prices exerted by the European wheat shortage of 180 million bushels compared with last year.

(3) Crops of coarse grains, which are in part substitutable for bread grains and whose prices are interrelated with those of bread grains, were poorer in 1924 than in 1922. The reported crops of corn, oats, and barley in the Northern Hemisphere are nearly 10 per cent less than last year. European crops of coarse grains, however, are only 5 per cent less than last year, and 10 per cent greater than in 1922. But the enlarged animal husbandry of the continent makes for greater requirements. Poor crops of coarse grains in Argentina tend to aggravate the situation. Feeders and industrial users of coarse grains have been bidding up the prices, thus contributing to raise prices of wheat and rye.

(4) The potato crop of Europe, though generally larger than in 1923, was much poorer in 1924 than in 1922, both in quantity and in quality. This is especially true in western and central Europe, where the potato is of the largest relative importance. A bumper crop in France is the outstanding exception, though crops in Germany and Poland are of good size.

(5) Moreover, mere increase of population calls for annual increases in wheat requirements. Furthermore, increasing economic readjustment from the abnormal war and post-war situation in Europe accelerated the increase in wheat requirements. Hence a normal requirement this year is larger than the normal requirement of two or three years ago.

Canadian Crop Most Seriously Affected

A late spring, combined with unfavorable weather during the critical growing season, accounts for the small size and poor quality of the Canadian crop. Planting did not become general in the Dominion until May, consequently there was a reduction of a million acres from the high figure of 1923. No official forecast of the probable size of the crop was made until the end of June; but even by that time there had been so much dry weather in important producing areas that the government put out a statement implying a yield of only about 14.5 bushels per acre, as compared with the final report of 21 bushels last year and an average of 19.8 bushels before the war.

Drought continued during the first part of July, but was broken in most sections during the latter half of that month. However, the condition report issued by the government for the end of July showed a further decrease in the anticipated yield. In August the favorable influence of rains was partially offset by damage from other causes, including frost, rust, and sawfly. The official report then showed improvement for the crop as a whole, however, and the yield per acre was estimated at 13 bushels, the total crop at 292 million bushels. From that time on there was deterioration, the October 31 report placing the total output at 272 million bushels and that of December 31 at 262 million bushels.[1]

The quality of the Canadian crop is exceptionally poor. Of the grain inspected in western Canada during the first four months of crop moving, only 60 per cent was of contract grade, i. e., No. 3 or better. If these inspections prove typical, the crop will average lower than any other post-war crop, as shown by Table 3.

However, much of the low-grade Canadian wheat, while containing damaged grain, is high in protein content. Consequently it is suitable for milling, indeed is well adapted for blending with European soft wheats, which are lower in protein content as well as light in weight. Since the flour

[1] For spring-wheat estimates, see Wheat Studies, No. 1, Appendix Table VI. The December 31 estimate is 240 million bushels.

yield per bushel is abnormal, this wheat naturally sells at a discount under standard grades; but in December, Manitoba No. 4 was practically on a par in England with

TABLE 3. — GRAIN INSPECTED IN THE WESTERN INSPECTION DIVISION OF CANADA*

Crop year ending Aug. 31	Cars inspected	Ratio grading No. 3 or over
1919–20	100,014	72.7 %
1920–21	149,669	86.3
1921–22	181,623	75.2
1922–23	228,611	92.1
1923–24	294,468	86.0
1924–25 (Sept.–Dec.)	111,872	60.2

* Source: *Canadian Grain Statistics.*

No. 2 Hard Winter wheat. Europe is taking and will continue to buy this grain. Indeed, it now seems likely that most of the hard Canadian wheat grading 3 to 6 will pass into export.

EUROPEAN WEATHER VERY UNFAVORABLE TO CEREAL CROPS

In Europe also the small crop was due mainly to bad weather. In the exporting countries of the Danube basin—Hungary, Roumania, Jugo-Slavia, and Bulgaria—increases in wheat area amounted to about 1½ million acres; but elsewhere, especially in Italy, Spain, and France, there were almost counterbalancing reductions. For Europe as a whole, exclusive of Russia, the wheat acreage was increased by about 300,000 acres. The Russian wheat acreage in 1924 was considerably larger than in 1923, —43 million acres as compared with 35 million, according to unofficial estimates.[1]

Even early in the season it seemed probable that yields this year were not going to be so high as last. Broomhall reported in the *Corn Trade News* of April 1 that the severe winter had caused damage in several countries. At that time, however, the Russian and Roumanian crops were still promising. During the next two months conditions became less satisfactory. In northern Europe the spring was late and wet, while around the Mediterranean and east into southern Russia there was damaging drought. On June 11 Broomhall reported that "prospective yields have been reduced in Italy, Greece, North Africa, the Balkan countries and southern Russia," and estimated the loss to be at least 80 to 120 million bushels.[2]

During June and July the weather was better, but the damage was not offset. Broomhall increased his estimate of drought damage in southern Europe[3] and reported a serious situation in Russia arising from the combination of drought and vermin. Official Russia still forecast a larger crop for 1924 than that of 1923, though this seemed doubtful in view of weather conditions. In central Europe, also, conditions were less promising. French crops, however, seemed to be progressing satisfactorily, and the British outlook was still favorable.

By August harvesting was well advanced in southern Europe and there was no longer any doubt that crops were short. In northern Europe from that time on, the crops steadily deteriorated. The weather was excessively wet, which not only made harvesting difficult but for the time at least made quantities of damaged wheat unmarketable. On September 23, Broomhall reported that there was "no doubt about the poor quality and condition of much of the home-grown supply of the chief importers of western Europe."[4] From France it was reported that much wheat was sprouted and mouldy. The German Government, in October, issued a report describing the position of the crops still in the fields as most critical; much of the bread grain, it stated, would be quite unfit for milling, or else so poor that the flour yield was likely to be very short. The English crop was reported as badly weathered and musty. Later Broomhall stated that much of the English wheat was so poor that it could be used only for animal fodder, while, although the French crop was large in volume, much of it was of poor quality.[5] In Russia conditions were so serious that in October the government admitted that there would be no wheat for export.

[1] *Foreign Crops and Markets,* Nov. 12, 1924, p. 489.
[2] *Corn Trade News,* June 11, 1924.
[3] *Ibid.,* July 1, 1924.
[4] *Ibid.,* Sept. 23, 1924.
[5] *Ibid.,* Sept. 30, Oct. 7, 1924.

In October and November drier weather in many countries made possible the threshing of grain under favorable conditions, thus converting into millable grain of low quality much that otherwise could have been used, if at all, only for feed. Despite this improvement, there is no question that European crops have been inferior in quality even more than in amount.

Latest estimates of European production in 1924, in comparison with earlier years, are given in Table 4. It will be observed that only in France and in Jugo-Slavia were the 1924 crops larger than those of 1923. The largest proportional reductions occurred in Poland, Roumania, Italy, and Spain. On the whole, however, if present estimates are to be trusted, the European crop was the largest since the war except for 1923; and with the exception of Roumania, Bulgaria, and Poland, the crops look small only in comparison with the good crops of 1923.

TABLE 4. — WHEAT PRODUCTION OF PRINCIPAL COUNTRIES OF EUROPE, 1922–24, COMPARED WITH PRE-WAR AVERAGE

(Million bushels)

Country	1909–13 average	1922	1923	1924
Roumania	158	92	102	74
Hungary	71	55	68	50
Bulgaria	38	38	36	28
Jugo-Slavia	62	44	61	70
Total exporters	329	229	267	222
United Kingdom	60	65	58	55
France	326	243	276	282
Germany[a]	131	72	106	89
Italy	184	162	225	171
Spain	130	125	157	126
Czecho-Slovakia	38	34	36	34
Poland	64	42	50	33
Others	86	72	86	70
Total importers	1,019	815	995	860
Total Europe (ex-Russia)	1,348	1,044	1,262	1,082

[a] As explained in WHEAT STUDIES, No. 1, p. 17, the pre-war estimates are high, and the post-war ones low.

RUSSIA, NORTH AFRICA, AND INDIA

During the summer Russian official reports carried an optimistic tone, but by November it was apparent to the European trade that Russia would have little grain for export this year and might, indeed, be forced to import. Drought during the summer was widespread in southern Russia, and famine threatened again to fall on sections that had not yet recovered from the physical effects or the recollections of the famine of 1921. Since it was clear that the government would be obliged to undertake substantial transfers of grain from surplus-producing areas to deficiency areas, the prospect of export faded. The most reliable reports estimate the total grain crop to be between 45 and 47 million short tons, a decrease of 4 or 5 million short tons as compared with 1923.[1]

The autumnal marketing of grain lagged. When the government undertook to accelerate the movement, peasant resistance became manifest. Despite official optimism, the grain trade of Europe came to the view that not only would exports of wheat and rye from Russia decline to negligible figures, but imports into northern Russia might be required for the purpose of sustaining the industrial proletariat of Moscow and Leningrad, and to stabilize prices and movements. Substantial imports and import orders have since borne out this expectation. Russia has apparently a good crop of oil seeds. These may be expected to pass into export in relatively large volume, in effect to exchange feed for food. Russian imports and exports have a larger meaning in the psychological than in the physical sense.

It was known early in the season that the North African crop would be small, since the drought which injured the southern European crop also affected North Africa. According to the latest estimate, 84 million bushels were harvested in 1924, distinctly below last year's output of 107 million bushels, but not so low as the outputs of 1920 or 1922. The short crops in North Africa aggravate the shortage of durum wheat. It seems probable that Algeria, normally a wheat exporter, will be a net importer this year.

The crop of British India, harvested last spring, was reported by Broomhall in June[2] to be much superior to last year's in both

[1] *Foreign Crops and Markets*, Nov. 12, 1924, p. 493.
[2] *Corn Trade News*, June 17, 1924.

quantity and quality. The latest official estimates, however, show a slight reduction. The acreage this year was slightly larger and the yield per acre a little lower than last year. On the whole, however, there has been little variation in the Indian output of the last three years, and both crops and yields during this period have been close to the pre-war average.[1]

It is still too early to estimate the Indian crop of 1925, some of which may be available for the current crop year. According to present information, however, the planting season has been favorable, and there is reason to anticipate in 1925 a crop at least as large as that of 1924.

American Crop an Excellent One

In the United States the situation was in marked contrast to that in Canada and Europe. Here, notwithstanding a large reduction in wheat acreage as compared with last year (or any other post-war year), there was a very considerable increase in total production. Planting for winter wheat covered only 40 million acres as compared with 46 million planted for the 1923 harvest, but less acreage than usual was abandoned and the reduction in harvested winter wheat acreage was only about 3 million acres.[2] There was a reduction of over 2 million acres in spring wheat land; hence the total reduction in harvested acreage was nearly 5½ millions. Production of winter wheat was 590 million bushels, or about the same as that of 1922, when the area harvested was 6 million acres greater; while the spring wheat output was 283 million bushels as compared with 281 million in 1922, when the area was over 2 million acres larger.

Table 5 shows the acreage, production, and acre yield of winter and spring wheat this year as compared with earlier years. The impressive feature of this table is the high yield per acre for both winter and spring wheat, in each case distinctly the best since the Armistice and well above the pre-war average. The winter wheat yield per acre has been exceeded only four times (1906, 1913, 1914, 1915) and the spring wheat yield only three times (1912, 1915, 1918) in the last twenty-five years, and the aggregate yield only twice (1914, 1915) in our history. This improvement occurred in spite of poor crops in the Pacific Coast states and moderate yields of soft winter wheat.

Table 5.—American Wheat Production, Acreage, and Yield per Acre*

Year	Production (million bus.)		Acreage harvested (million acres)		Yield per acre (bushels)	
Average	Winter	Spring	Winter	Spring	Winter	Spring
1909–13	441	249	28.4	18.7	15.6	13.3
1919	760	208	50.5	25.2	15.1	8.2
1920	611	222	40.0	21.1	15.3	10.5
1921	600	215	43.4	20.3	13.8	10.6
1922	587	281	42.4	20.0	13.8	14.1
1923	572	225	39.5	20.1	14.5	11.2
1924	590	283	36.4	17.8	16.2	15.9

* U. S. Dept. of Agriculture *Yearbook, 1923,* and *Crops and Markets, Monthly Supplements,* 1924.

Undoubtedly one cause of improved yields lies in the withdrawal in recent years of lands yielding low returns per acre. The chief cause, however, lay in favorable weather conditions in the hard winter and spring wheat belts. It is a hard wheat year.

It was not fully apparent until well on in the season that the crop was going to be so excellent. The fall-sown wheat wintered well in the hard wheat areas, but soft wheat suffered considerable damage. The abandonment of planted areas was less than the average before the war and far below that of the two preceding years.[3] In the spring-wheat states, soil and moisture conditions at the time of planting were reported the best in several years. Altogether, the crop made a good start.

The early estimates of the probable size of the crops as usual required radical revision. The April and May estimates of the Department of Agriculture forecast an output of winter wheat of 550 million bushels, which implied a final yield per acre of slightly over 15 bushels, as compared with 15.6 bushels in the five years before the war. By that time it had become apparent that Kansas was likely to harvest

[1] See above, Table 1, p. 79; Wheat Studies, *No.* 1, Appendix Table I; and below, pp. 99–100.
[2] See Wheat Studies, No. 1, Appendix Table III.
[3] See *Ibid.*

an unusually large crop, Illinois a small one, and the far western states not more than half a crop. Toward the end of May, dry weather became pronounced in Kansas and Nebraska, and the earlier reports of drought in the west were confirmed. Consequently, in its June 7 report the Department reduced its estimate of winter wheat output to 509 million bushels. In issuing its first spring-wheat report at the same time, it estimated a total of 184 million bushels. Unofficial estimates of the winter-wheat crop were some 40 million bushels higher.[1]

With the coming of rain, conditions improved rapidly and continuously in Kansas and in most sections of the country. In the hard winter wheat areas, the grains filled out remarkably in the later stages, and were harvested in an excellent condition. Hence the striking increase in the Department's estimate of 509 millions as of June 1 to 589 millions August 1. In the spring wheat area the improvement over average condition continued throughout the season, causing a net increase in the estimate from 184 millions as of June 1 to 283 millions as of December 1.[2]

The 1924 wheat crop is distributed quite differently from that of 1923. The hard winter wheat crop, produced chiefly in Kansas, Nebraska, and Oklahoma, is abundant and of high quality, whereas last year it was short and poor. The hard spring wheat crop, produced chiefly by Minnesota, the Dakotas, and Montana, is also large, far larger than last year, and of good quality as well, but in part of lower protein content than the crop of 1923. Owing to drought, crops in the Rocky Mountain states, except Montana and Colorado, were poor, and in the Pacific Coast states very poor. Soft winter wheat crops varied from state to state, but were on the whole deficient, notably so in Illinois, the largest producer, and in Missouri, and the protein content is much lower than that of the larger crop of 1923.

[1] See *Price Current-Grain Reporter*, June 18, 1924.
[2] See WHEAT STUDIES, No. 1, Appendix Tables IV and V.
[3] *Crops and Markets*, November 1924 *Supplement*, p. 386.
[4] See above, Table 1, p. 79, and WHEAT STUDIES, No. 1, Appendix Table I.

Taken as a whole, the wheat is grading high. Of that inspected by the Government in the months of July, August, and September, 88 per cent graded No. 3 or better, as compared with 80 per cent of the 1923 crop and 82 per cent of the 1922 crop. Some 28 per cent graded No. 1, also a relatively high figure.[3] The high grading of the hard wheat is paralleled by milling quality.

AUSTRALIAN CROP EXCELLENT, ARGENTINE ONLY FAIR

The Australian and Argentine harvests are now completed, and much of both crops is already sold. It is possible, therefore, to obtain fairly accurate forecasts as to final output in these two countries.[4] In both countries a somewhat larger area was planted to wheat this year than last,—in Argentina 17.7 million acres this year as compared with 17.2 million last year; in Australia 10.8 million this year and 9.5 million last year, making a total increase of almost two million acres.

In Australia weather conditions were favorable during most of the growing season. The latest official estimate is 162 million bushels, reflecting the best yield per acre since the bumper crop of 1920. This compares with an average of 90 million in the five years before the war and with 126 million last year. The Argentine crop suffered from early drought and frost and from late rains, and is consequently much poorer than last year's. The most serious damage was suffered in southern Argentina; the northern section of the country appears to have an average crop. Estimates have declined during the season. The latest figure for Argentina is 191 million bushels, small considering the acreage harvested. The condition of the wheat is fair to good.

WHEAT SUBSTITUTES ALSO SCARCE

Coarse grains and potatoes serve as substitutes for wheat on the European dining table and in the feeding yards. This year's world supply of wheat, rye, corn, oats, and barley is considerably short of the volume of last year. Taking the countries for which comparable estimates are available (which

approximate a world total) there has been a reduction of practically 10 per cent. The reduction is slight in oats and barley, heavy in corn and bread grains.

Rye. In Europe the 1924 rye crop suffered even more seriously than wheat. The three important rye districts are Russia, Germany, and Poland. Weather conditions were extremely unfavorable to the crop in all three countries. Excluding Russia, the total European output was 663 million bushels as compared with 827 million in 1923.[1] This means a reduction of about 20 per cent to augment a 14 per cent reduction in the European wheat output. The Russian crop suffered so badly that Russia has none for export, whereas last year she exported 43 million bushels. The only country outside of Europe that produces rye on a considerable scale is the United States. Here the crop, now estimated at 64 million bushels, was distinctly good, considering the acreage harvested. Upon the whole the world rye crop is the poorest since 1920, and only about 73 per cent of the pre-war average. The world exportable surplus of rye does not seem to be over 60 million bushels. The price of rye has risen relatively more than that of wheat.

Corn. The world supply of corn (maize) this year will probably be short of the 1923 total by about the same ratio as the decrease in European wheat production, i. e., 15 per cent. But instead of Europe, it is the United States which suffers in this case.[2] The Danubian countries and Italy, which produce the major portion of the European domestic supplies, have good crops. In the United States, however, where production is usually three-fourths that of the world, weather conditions this year were unfavorable. Consequently the total output is lower than in any year since 1903 and over 600 million bushels less than last year. The quality of the crop is also poor. Though a great deal of the crop is unmerchantable, that fact has reduced significance because about 80 per cent of the corn is fed in the county where it is grown. Some 17 million acres of corn, 16 per cent of the acreage, were utilized for ensilage and forage. Argentine has still some unsold old corn and a large acreage of new corn.

Potatoes. The potato crop of the United States is relatively large, the price is low. There is, however, little substitution for wheat by potatoes in the United States, and little mobility in American potatoes except for commercial grades of table potatoes. In northern Europe, where the potato is used for feed, industrial material, and alcohol production, the crop is mobile, and by substitution potatoes may be employed to cushion a shortage of cereals. This makes the potato much more important in Europe, in the event of cereal shortage, than in the United States.

At present it appears that the north European potato crop is above normal size, though smaller than two years ago,[3] but probably subnormal in quality. The British crop is small and poor, and British potato prices are very high. The German crop is reported some 12 per cent larger than last year; the crop in Poland is slightly larger than the fair crop of last year; the French crop is exceptionally large. In several countries, however, potatoes were harvested in a moist condition, and a heavy spoilage may be revealed when the stored stocks are uncovered in the spring. Nevertheless, the wastage will fall on feed uses rather than on food uses, and a notable substitution for bread grains by potatoes may be expected over northern continental Europe.

Oats and Barley. An excellent crop of oats in the United States will serve here to relieve in some measure the shortage of corn. On the other hand, the European crop is short, Germany alone reporting a fair yield. Russian export supplies are negligible, the Canadian crop is far below last year's, and the Argentine crop is below the average.[4] Since Canada and Argentina, the principal exporters, have reduced supplies, Europe will have to depend more heavily on the United States.[5]

[1] See Appendix Table I (*A*) for details and comparisons.

[2] See Appendix Table I (*B*) for details and comparisons.

[3] See Appendix Table I (*F*) for details and comparisons.

[4] See Appendix Table I (*C*) for details and comparisons.

[5] See an excellent brief statement published by Bartlett, Frazier & Co., Chicago, Dec. 12, 1924.

The world supply of feed barley is also short,[1] though the total barley crop of the Northern Hemisphere is slightly above the average for 1920–23. United States exports of oats and barley to Europe for the period July to December were more than double those of the corresponding period of last year.

Rice. So far as Asia is concerned, present information indicates a rice crop considerably larger than last year's, but smaller than that of 1922–23, except in Siam, which has apparently harvested a bumper crop.[2]

Before the season is over Europe may find the problem of feeding stuffs almost as difficult as that of bread grains. Export oats cannot make up the shortage in export corn, partly because of transportation conditions. Europe has a relatively large crop of potatoes, fodder roots, and by-products of sugar beets. It is the need for concentrates on the part of feeding-yards and dairies for urban consumption which constitutes the problem. Fortunately, there is an abundance of oil seeds, at prices relatively low compared with prices of coarse grains. The relative positions, in the world's market, of the prices of wheat, rye, corn, oats, barley, and oil seeds during the remaining months of the season, will furnish an interesting field of observation.

Contrasting 1924–25 with 1922–23, when Europe also had a short crop of wheat and rye, it seems clear that the supply and the availability of substitutes will be less now than then, particularly north of the latitude of the Alps. As against this, the high wheat prices constitute a greater incentive to substitution, particularly on the part of the rural population.

III. IMPORTERS' REQUIREMENTS

From 1920 until the present season, the world wheat market was a buyer's market. This season it is a seller's market. Under these circumstances, a scrutiny of considerations of demand is of particular importance. This is especially necessary in connection with the wheat "deficiency" countries, whose "requirements" for imports express demand in the international market.

The Nature of Importers' Requirements

Apart from the fact that importing countries are by no means a unit, the concept of importers' requirements, while seemingly definite, is susceptible of different interpretations, and these may vary from season to season. The term might be used simply to mean the imports that will actually be made. It might mean the quantity which importers will take as a minimum, while making all possible substitutions in the diet with rye, potatoes, barley, corn, oats, and other foodstuffs, at the same time restricting the use of wheat as animal feed and establishing a higher rate of extraction in milling. It might mean the amount necessary to furnish the average per capita supply of wheat or bread grains, milled at customary rates of extraction, irrespective of plenty or scarcity of other foodstuffs. It might mean the amount necessary to provide a total food supply in terms of calories, up to a normal level, offsetting deficiencies in meat, dairy products, sugar, and other foods. The variations between the minimum and maximum requirements, thus defined, would amount to several hundred million bushels.

An industrial analogy will make clearer the various meanings of "importers' requirements." A country imports copper. At a relatively high price, it will import only to cover essential uses of the metal; at a moderate price, imports will be broadened to supply copper for certain uses where other metals could be technically employed; at a low copper price, imports will be expanded to provide copper as a substitute for other metals. While the elasticity of demand for wheat is different from that of copper, similar considerations apply.

[1] See Appendix Table I (*D*) for details and comparisons.

[2] See Appendix Table I (*E*) for details and comparisons.

The factors determining importers' requirements are largely technical, but in part social and political. In a period of political and industrial instability, the level of the food supply and the state of public satisfaction with the dietary may exert a special influence on imports. Governments may even elect to import food, irrespective of price, by mortgaging the resources of a country, in order to maintain political stability and avert perversive social disorders. Under stable social conditions, however, price exerts the predominating influence in determining the effective requirements of a given year. A minimum requirement may exist independent of price influence; but beyond that, importers' requirements are different at different price levels. Estimates of quantities "required" must therefore have reference to assumed import prices of wheat, as well as to numerous factors in the economic and social situation in individual importing countries. The experience of 1923–24 strongly supports this view; and the different experience of the current year may be expected to give it further support.

Pre-War European Demand Relatively Constant

The principal wheat-importing area consists of the present Europe, exclusive of Russia. Within this area a few countries, such as Spain and Poland, are normally self-sufficing in wheat; a few others, in the lower Danube basin, are normally exporters. Practically every other country imports either wheat or rye or both. The other important wheat-importing area is the Far East, notably China and Japan; but the requirements of a large number of scattered markets, mostly tropical, make up a considerable total.

For the European area, it is illuminating to contrast the variations in per capita consumption before and since the war and their bearing upon import requirements in the current year.

It is difficult to make comparisons of the per capita wheat and rye consumption of pre-war and post-war Europe, on account of changes in boundaries, defective statistics of population, and the fact that comparable crop estimates before the war were not available for all countries. Of the net-importing countries of Europe it has been possible to obtain comparable figures for Scandinavia, Belgium, Holland, Germany, France, Switzerland, Portugal, Italy, and the United Kingdom (combined population 226 million). For the net-exporting countries, comparable figures are available for Austria, Hungary, Bulgaria, Roumania, Jugo-Slavia, and Czecho-Slovakia (combined population 62 million). In Table 6, comparing pre-war and post-war bread-grain consumption, these combined countries constitute a special "Europe" (total population 288 million). The principal countries omitted are Spain, Poland, the Baltic States, Greece, and Turkey in Europe.

Table 6.—Per Capita Bread-Grain Consumption of Special "Europe," Pre-War and Post-War*

1907–14 average	472	pounds
1907–08	446	"
1908–09	445	"
1909–10	479	"
1910–11	467	"
1911–12	473	"
1912–13	499	"
1913–14	493	"
1921–24 average	413	"
1921–22	416	"
1922–23	385	"
1923–24	437	"

* Sources: *International Yearbook of Agricultural Statistics* and *International Crop Report*. Post-war population from League of Nations, *Monthly Bulletin of Statistics*, Vol. V, No. 7. Figures are for special "Europe" of 288 million population.

Table 7 (p. 88) gives the approximate wheat supplies per capita for the net-importing countries of Europe and for the special "Europe" in the years 1907–14 and 1921–24.

Before the war the average per capita wheat supply for "Europe," as a whole, was 5.36 bushels; for the importing countries alone, 5.57 bushels. The wheat consumption of the wheat-surplus countries was less than the consumption of the wheat-deficiency countries. The lowest figure for "Europe" was 4.95 bushels, 7.6 per cent less than the average; the highest figure was 5.75 (in the abnormal year of the Balkan

wars), 7.2 per cent above the average; the largest per capita supply for any one year was 117 per cent of the smallest supply for any one pre-war year.

TABLE 7.—PER CAPITA WHEAT SUPPLIES FOR IMPORTING AND SPECIAL EUROPE, PRE-WAR AND POST-WAR*

(Bushels)

Year ending July 31	Importing Europe *a*	Special Europe *b*
1907–14 average	5.57	5.36
1907–08	5.58	5.12
1908–09	5.10	4.95
1909–10	5.67	5.37
1910–11	5.41	5.28
1911–12	5.58	5.45
1912–13	5.87	5.75
1913–14	5.81	5.61
1921–24 average	5.27	5.13
1921–22	5.50	5.22
1922–23	4.88	4.80
1923–24	5.43	5.37

* Sources: *International Yearbook of Agricultural Statistics* and *International Crop Report*. Post-war population from League of Nations, *Monthly Bulletin of Statistics*, Vol. V, No. 7.

a Includes countries having a total population of 226 millions.

b Includes countries having a total population of 288 millions.

If due allowance is made for the fact that the methods of assembling the data (neglecting carryovers) tend to increase the year-to-year variations in per capita consumption, these figures give an idea of the constancy of European wheat consumption in normal times. Post-war levels of consumption are considerably lower than pre-war.

Imports have varied more than consumption. In the seven years before the war, the highest figure for net import was 187 million bushels above the lowest.

IMPORTANCE OF RYE IN EUROPE

Wheat is only one bread grain in Europe, and though the import of wheat greatly predominates over that of rye, in the total continental supply of bread grain rye is half as important as wheat, while north of the latitude of the Alps (disregarding the United Kingdom) the two grains are practically equivalent. In effect, Europe imports wheat to complete the bread-grain supply, not merely to complete the wheat supply.

Using again the special "Europe" previously defined, the average per capita annual bread-grain supply before the war was 472 pounds, of which 322 were wheat and 150 were rye. The highest annual per capita consumption was 499 pounds, or 106 per cent of the average; the lowest was 445 pounds, or 94 per cent of the average. The highest annual per capita consumption was 112 per cent of the lowest.

The 1924 rye crop of the present Europe is given provisionally as 663 million bushels. Before the war Europe was a net importer of rye to the extent of 30 to 40 million bushels a year. Last year, with the return of Russia to export, Europe imported from Russia some 43 million bushels of rye and from overseas in addition 40 million bushels. This season Russia has little rye to offer. Rye is in the "tightest" international position of any grain. German bakers find it necessary, or advantageous, to add American rye to domestic rye flour for urban use. The year's exportable surplus from North America, including old grain, is not over 60 million bushels. Accordingly Europe cannot make good the shortage in rye by importing more than this amount, and must rely rather upon imported wheat and substitution of domestic coarse grains and potatoes.

During the past three years the average per capita bread-grain supply of the special "Europe" was 413 pounds; the lowest, 385 pounds in 1922–23; the highest, 437 pounds in 1923–24. With the present estimations of the bread-grain crops, the present Europe would this year need to import 36 billion pounds in order to afford a bread-grain ration of 385 pounds, the lowest of the last three years; she would need to import 46 billion pounds of bread grains to supply a ration equal to the average of the last three years; and she would need to import 54 billion pounds of bread grains to secure a supply equal to the largest of the last three years. Assuming that 60 million bushels of rye represents the maximum possible import of rye, the amounts of wheat necessary to be imported to secure the bread-grain ration on the three levels of consump-

tion would be as shown in Table 8. Comparable figures for importing Europe would be, respectively, 528, 695, 799.

TABLE 8.—WHEAT IMPORTS REQUIRED IN 1924–25 TO BRING EUROPEAN BREAD-GRAIN CONSUMPTION TO VARIOUS LEVELS

Consumption level	Per capita consumption	Gross imports required
Post-war, 1921–24	*(pounds)*	*(million bushels)*
Lowest	385	540
Average	413	707
Highest	437	851

These figures for wheat imports necessary to provide a bread-grain supply on the three stated levels, may be compared with the estimates of importers' requirements made by various authorities, official and otherwise. The other estimates, cited below, were apparently based on considerations of wheat alone, and are thus not altogether comparable with figures reached by the foregoing methods.

VARIOUS ESTIMATES OF NET WHEAT IMPORT REQUIREMENTS COMPARED

Sir James Wilson in November forecast the import of 608 million bushels, more than sufficient to provide the lowest per capita bread-grain consumption of the past three years. The Department of Agriculture in November suggested a range of from 496 to 593 millions, the maximum figure being below the amount required to yield the lowest annual supplies per capita in the seven years before the war, and not much above the amount required to yield the lowest per capita supplies since the war. Broomhall's figure of 624 millions, while seemingly higher, should be compared not with net import figures, but with his own figures of shipments to Europe, which are considerably higher. On the whole, these authorities agree, in effect, that Europe's import requirements in 1924–25 will not be such as to bring the per capita consumption up to the average for the past three years, which is well below the pre-war average. It is clear that if 630 million bushels of wheat, the approximation we suggest, are imported, the European bread-grain supply for the season would be notably below the supply of last season, and considerably below the average of the past three years.

SPECIAL FACTORS AFFECTING IMPORT REQUIREMENTS

Such calculations as the foregoing suggest a wide range within which the actual requirements of Europe in the present crop year may lie. It is insufficient to consider the bare statistics. Before attempting to narrow the range, or to arrive at a specific estimate, it is necessary to consider several factors which affect the requirements of the current year. Six deserve special consideration, namely: (1) the lateness of the 1924 harvest; (2) the quality of the 1924 crops; (3) the availability of substitutes; (4) restrictions of consumption; (5) the price of wheat; (6) Europe's ability to finance imports.

(1) Late Harvests of 1924. As the result of the cold, wet summer, the 1924 harvests of wheat and rye were quite generally delayed in western and northern Europe. In view of this fact, stocks in the hands of importers and millers were scant; and with the postponement of harvests, scarcity was anticipated. This led to such rapid buying that for a time the volume of import somewhat exceeded the current needs of the continent, as was evidenced later by considerable reselling of wheat in the principal ports. Viewing the year as a whole, the late harvest means that if the 1925 harvest is neither late nor early, the 1924 crops will be used for somewhat less than a full year, whereas both the 1923 harvest and 1923–24 imports contributed something to the crop year 1924–25. This factor, while it has increased early imports, may make for no corresponding increase over the year as a whole.

(2) Quality Below Normal. The 1924 crop of bread grains of Europe was distinctly below normal in quality, as has already been noted. An unusual fraction of the grain is soft, wet, and unmillable, and the grain that is termed millable is below the average. The condition of the soft pale wheats of the western countries is poorer than the semi-hard red wheat of the Danubian and Balkan areas. In some years in Europe wheat is dry enough to go from threshing to milling directly. This year it was not fit to go to the mills for weeks.

It seems certain, however, that for many parts of Europe lowness of yield and inferiority in quality have been somewhat exaggerated. October weather was favorable for the maturing, threshing, and drying of bread grain. Consequently, the yields were slightly improved in quantity and the millability of otherwise moist wheat and rye improved to an indeterminable extent. The stated crop, as of January 1, is larger and more merchandisable and millable than was expected on October 1. Viewed as a unit, however, both weight and protein content of the crop are below normal. Possibly as much as one-sixth of the European crop of this year would last year have been called tail wheat.

The low quality of the European crop not merely increases the tail wheat for feeding; it also lowers the yield of normal flour; or, ground like normal wheat, the grain produces an abnormal flour. This upsets the blending formulas and disturbs the import programs of large mills. If Europe had the choice among imports, she would select quality to supplement her poor wheat; but since supplies are short, she is likely to utilize all types, including North American inferior grades. More than ever, Europe this year seeks high protein wheat. The net effect of the poor quality is definitely to raise import requirements above the statistical position, and to increase the amount of tail wheat available for animal feed.

(3) Substitutes for Bread Grains. The position of substitutes for bread grains has been discussed above (pp. 84–86). On the whole, the European corn crop is good, crops of oats and barley are only mediocre, the potato crop is large but of generally inferior quality, supplies of oil seeds are fairly abundant, and the sugar-beet crop is exceptionally large.

The large supplies of domestic sugar will not greatly affect cereal requirements, except as they increase the ability of sugar beet-growing countries to finance imports. Sugar-beet residues increase fodder, but not the kind that replaces cereals. The larger potato crops, however, despite the poor quality, are likely to reduce considerably the cereal requirements for food, as compared with last year. The availability of oil seeds will offset in some degree the deficiencies in grain crops.

It might relieve conditions in western Europe if the inhabitants of Hungary and the Balkan States were to increase consumption of corn and release wheat for western Europe. There are, however, a number of difficulties in the way—inertia of peasants, transportation difficulties, currency fluctuations, export taxes, and the recently stimulated taste for wheat. The drawing out of more corn there may possibly result in drawing out less wheat. The short crop in America, and the stagnation in the Balkans, throw Europe back on long-haul corn of the Southern Hemisphere.

Western European demand for fodder grains varies with the supply of oil seeds. Last year Russia furnished a considerable volume of oil seeds, and expectations are high again this season, as Russia has good oil-seed crops and is in dire need of foreign credits. To make up for scarcity and high price of corn in the foreign market, western Europe may further increase her importations of oil seeds, freely available from the large cotton-seed crop of the United States and in various tropical countries. If Europe is able, through freer importation of oil seeds during the winter, at comparable price levels, to divert a considerable amount of domestic coarse grains, directly and indirectly, for the relief of the wheat situation, a good deal may be accomplished toward lowering what otherwise would be the wheat-import requirements.

(4) Restriction of Consumption. Higher extraction in milling of bread grains represents a practicable adaptation to a short crop. France requires 78 per cent extraction in the milling of wheat. Higher extraction is being proposed and undertaken in other countries and may become quite general before spring. This means more flour and less grain offal, more bread and less milk. Within feasible limits of higher extraction, possibly 10 per cent may be added to the volume of flour secured from the crop sent to the mills. A questionnaire sent out over Europe during the past summer has elicited the fact that except in France the percentage of extraction in milling had declined practically to the pre-war

level. Hence, under the stringency of the present year, there is room for considerable reduction of requirements through general raising of the percentage of extraction.

Another method of stretching bread-grain supply is by the compulsory addition of potato or coarse grain to wheat and rye flour. This exists in France, has been proposed in other countries, and may become widespread by regulation (or adulteration) before the close of the crop year.

Peasants and city workers may be expected, however, to resist the return to gray or to adulterated flour, each group for its own reasons; and it is impossible to estimate how far these measures will be carried into practice.

Another possibility lies in restriction of the feeding of wheat and rye to domestic animals. Before the war, according to official government estimates prepared for the food administrations of the different countries, 10 per cent of the crop in the United Kingdom, 2 per cent in France, 3 per cent in Italy, and 10 per cent in Germany and Austria-Hungary, after subtraction of the seed, went to animals and industries. The figure for rye was considerably larger; in Germany 25 per cent of the crop of rye, after subtraction of the seed, went to animals and industries. The practice of using bread grains for animals and industries was prohibited or curtailed during the war, but since the war these restrictions on feeding bread grains to animals have been generally abolished. Up to date we have no information that such restrictions have been reimposed, except in France. Peasants are, therefore, at liberty to sell their low-quality wheat and rye or to feed them.

The price of grain will have much to do with the peasant's decision. In some parts of Europe, wheat that is barely millable is bringing a higher gold price than was secured last year for standard wheat. No. 6 Canadian spring wheat has latterly been sold in Liverpool for 145 cents per bushel, illustrating the comparable price of low-grade domestic wheat in Europe. The reactions of peasants will vary from section to section, depending on prices and availability of coarse grains, oil seeds, potatoes, sugar-beet residues, and other fodders, all evaluated locally in accordance with the particular position of animal husbandry. Probably the cumulative influence of the high price will be in the direction of a maximum marketing of wheat and rye, so far as they are millable. At present prices of wheat, the cost of grain offal in imported wheat is very high, and some parts of Europe will find it better to import wheat flour and oil cake rather than wheat.[1]

(5) High Wheat Prices. Without presuming to forecast the price of wheat through the remainder of the crop year, it can be taken for granted that wheat will remain very much higher than in 1922–24, and that it will be accounted distinctly high in price. This has a threefold tendency—to restrict food consumption, to keep to a minimum the use of millable wheat for feed, and to increase the plantings for next year's crop.

In continental Europe the price of flour follows the price of wheat and the price of bread follows the price of flour more closely than in this country, since European bread contains little more than flour, salt, and yeast, and costs of manufacture and distribution are small. Bread prices have not been fully decontrolled in Europe since the war. In several countries, particularly in municipalities more or less under the control of socialists, the price of bread has been under restraint, or at least subject to efforts at restraint. Although regulation of bread prices and loaf weights was abolished in Germany in October, these efforts at restraint of the price of bread have in general been intensified and extended by the higher prices of the recent months. Inquiries into bread prices are now quite the order of the day in European parliaments.

Agitations against a rise in the retail price of bread and enactments for the control of these prices influence importers' requirements, by interfering with the substitution of other foodstuffs for bread. They accelerate the trend in the directions of

[1] This tends to raise the price of "clear" flours from the United States, and these have been out of line upwards. The indications are that this year, as last, will see a heavy international trade in flour, though shipments in the Pacific and from Italy promise to be much smaller than last year.

higher extraction and use of stretching materials. They increase the hazards of bakers and millers. They introduce uncertainties into the statistical programs of importation. Importers who have been trying to get away from hand-to-mouth buying are likely to return to this opportunistic form of trading, rather than undertake long-term commitments and purchases for future delivery, at the risk of having the mills find the c. i. f. price[1] too high for the controlled price of bread. Government control of bread grain is reappearing under the stress of high prices. Prohibitions of export have been established in several countries, and even measures for government purchase and sale are being attempted. The extension of such control might have considerable influence on European demand for the year.

Certain of these activities clearly tend to counteract each other. The purpose of price control and of product specification is to reduce imports. On the other hand, artificial restriction of price tends to increase consumption by defeating the depressing effect of high prices on consumption, consequently favoring imports. This conflict between the domestic account and the international account may present a difficult problem for several countries in Europe. To attempt to hold down the price of domestic grain by control and at the same time to keep out imported wheat by tariff or other restriction at the frontier, is to aim at a reduced bread supply at a reduced price! And yet this is practically what has been attempted in France.

(6) Ability to Finance Imports. According to present indications, Europe's imports of bread grains, at the higher prices ruling in the current year, will cost perhaps 300 million dollars more than last year. This is no small item in the European balance of trade. Under conditions such as have prevailed in several years past, Europe's ability to finance food imports at such additional cost would have imposed narrower limits upon her actual imports, regardless of her statistical requirements.

[1] Trade abbreviation for "price plus cost, insurance, and freight."

Undoubtedly the cost of these imports is a limiting factor, and impels European countries to buy low-grade Canadian and American wheat at a discount under prices for standard quality grain. Nevertheless, it is clear that in financial resources Europe is distinctly better off than in any previous post-war year. Production and trade have recovered from much of the disorganization caused by the war and the subsequent financial crises. The bulk of Europe now has stable or fairly stable currency. The flow of capital and credit is much freer than it was. To a considerable extent business confidence has been restored. While conditions are by no means normal, in most countries, great gains have been registered in the past two years. The increased cost of grain imports will be partially offset by decreased cost of sugar and cotton imports, but in large measure will be covered by increased exports and by foreign credits often directly given to assist purchases of raw materials and finished goods. In some measure these imports will compete with imports of industrial materials, and hence will tend to retard industrial recovery. The ability to finance imports, however, seems unlikely to be important as an independent factor restricting European demand.

It is significant that in recent months sterling and certain other depreciated European exchanges which are not yet stabilized have risen in the face of exceptionally heavy grain imports, and that no country with stabilized exchange has found that stability jeopardized. Europe is fortunate in having the crop shortage occur at a time when her financial status has materially improved.

European Wheat Import Requirements Estimated at 600–660 Million Bushels

The foregoing discussion brings out the extraordinary difficulty of estimating European import requirements in the present year. The number of indeterminable factors is unusually large. The several influences of crop quality, of efforts to restrict consumption, of radical increases in prices, of possible changes in stocks, of Europe's ability to finance imports, are peculiarly difficult to gauge. The prospects next spring

for the coming harvest will have unusual weight. On this basis one can make but a reasoned guess, in the light of all these factors and of past experience.

A rational method of checking one's guesses is to consider, country by country, the reported crops and probable imports in the light of data for apparent consumption in previous years, supplemented by known facts concerning the present season.

Appendix Table II summarizes the quantities available for domestic use, disregarding carryovers, for leading importing countries in post-war years compared with a pre-war average, with rough estimates for the current year, on the basis of official data for wheat crops and reported imports. The estimates for 1924–25, with comparisons, are summarized in Table 9.[1]

TABLE 9.—AVERAGE WHEAT SUPPLIES AVAILABLE FOR DOMESTIC USE (DISREGARDING CARRYOVERS) AND NET IMPORTS IN LEADING EUROPEAN IMPORTING COUNTRIES, 1920–24, WITH ESTIMATES FOR 1924–25.

(Million bushels)

Country	Apparent domestic use		Net imports	
	Average 1920–24	Estimates 1924–25	Average 1920–24	Estimates 1924–25
Great Britain and Ireland	277.8	285– 295	214.2	230–240
Italy	276.8	261– 271	96.4	90–100
Germany	141.6	153– 163	49.4	60– 70
France	315.8	322– 332	46.0	40– 50
Belgium	50.3	49– 52	38.1	37– 39
Netherlands	29.1	29– 32	22.3	25– 27
Scandinavia	39.2	43– 46	18.4	28– 30
Switzerland	18.2	18– 19	15.0	15– 16
Austria	23.4	23– 25	16.3	14– 16
Czecho-Slovakia	49.1	46– 49	15.4	12– 14
Poland	44.8[a]	49– 51	1.6[a]	16– 18
Baltic States	11.4	14– 18	6.6	8– 11
Spain and Portugal	156.3[b]	139– 145	9.2[b]	5– 10
Greece	26.4	26– 29	15.1	17– 19
Total	1460.2	1457–1527	564.0	597–660

[a] 1921–24 average.
[b] Spain, 1920–23 average.

This summary leads to the conclusion that European net imports of wheat for the current crop year are likely to amount to between 600 and 660 million bushels, with 630 million as the probable figure. This would be considerably higher than the post-war average of net imports. It would, however, provide Europe with a total wheat supply little above the post-war average, and a per capita bread-grain supply decidedly below the average post-war amount, though higher than the lowest post-war figure, as shown by Table 8. We are disposed to accept this conclusion as reasonable, but it must be repeated that such estimates, always subject to a large margin of error, are this year especially difficult to make with confidence.

[1] The figures differ somewhat from those of Sir James Wilson as reported in *The World's Wheat, November 1924.*

Ex-European Wheat Imports

Imports of wheat and flour into the Orient have been much lower than during the same period last year. In the months of August, September, and October, the net imports of Japan proper were only about a million bushels, as compared with 9 million in these months of 1923. To a certain extent, consumption of import wheat in Japan, China, and eastern Asia generally, is rather a luxury practice, outside of the Caucasian population, and this despite the fact that there is a large domestic wheat consumption in China. Shortage of fuel, or fuel poorly adapted to a sustained fire, makes for the use of cooked cereals instead of baked cereals. Rice and millet lend themselves to cooking better than does wheat. The chief uses of wheat in the Orient are in the form of paste and also as a steamed bread. Under these general circumstances, the use of imported wheat is a somewhat artificial practice that was for several reasons expanded during the war, and has since then been promoted by low prices of wheat. One will not go far astray in assuming that when the price of wheat rises relative to the prices of competing cereals in the Orient, the use of imported wheats may be expected to retreat toward the pre-war dimensions.

The particular reasons for the heavy import of wheat and flour into the Orient last season were discussed in our *Review of the Crop Year 1923–24.* At the opening of the present season, the Oriental markets were

well stocked.[1] The disorganization in China and hard times in Japan, consequent on the earthquake, together with the behavior of the yen, tend to discourage importation of wheat. The unusually heavy adverse balance of trade of Japan for 1924 will tend to restrict her imports in 1925. China needs cereals badly, but one does not see how she is to pay for or distribute large amounts of imported wheat. An increase of 50 per cent in the price of wheat tends emphatically to discourage imports. The crop conditions in general have not been markedly good or bad in Asia, apart from floods in northern China. The preliminary estimate of the Japanese wheat crop of 1924 was some 36 million bushels of mediocre quality. Other things being equal, the import requirements would be estimated at 20–25 million bushels. The price of rice is relatively high, but to the Oriental we may be sure the present price of wheat appears still higher. Before the war the average imports of wheat into Japan were only some 4 million bushels. Purchases for Japan and China to date, mostly in Australia, but to some extent in North America, suggest that the imports for the current year may not be much larger than the pre-war figure. Domestic wheat is cheaper than foreign wheat.

Wheat imports of ex-European countries, outside of Asia, are less influenced by price than is the case in Japan and China. The wheat demand in countries like the West Indies and the East Indies, Brazil, and South Africa is relatively stable, owing to characteristics of the climate and the habits of the importing population. While the imports of last season may not be maintained, the pre-war level of imports may easily be exceeded, despite the present high prices. Provisionally, we see no present reason for expecting the ex-European wheat imports (excluding North America) to exceed 90 million bushels, and they are more likely to be as low as 80 million.

IV. EXPORTS AND EXPORTABLE SURPLUSES

With this view of importers' requirements, we may turn to the position of exporters, and consider, for the crop year as a whole, the supplies potentially available for export and the outlook for actual exports, in the light of the movement that has already occurred.

It must be emphasized at the outset that the actual exports in the remainder of the crop year will depend somewhat upon the price, and to a considerable extent upon the reported condition, especially late in the crop year, of the new crops. The present wheat price level will tend to call forth from exporting countries quantities of wheat which at lower price levels would be variously consumed or carried over. This is especially true of the United States and of India. In Canada, Argentina, and Australia, domestic consumption calls for a smaller proportion of the crop, and the exportable surplus is calculable within narrower limits. If next year's crops in India, the United States, and Canada do not promise well, reserves will not be allowed to fall so low as if the outlook were good, and smaller exports will be forthcoming only at still higher prices. Assuming, for the time, the continuance of distinctly high prices for several months, we may inquire what quantities, in the different export areas, are likely to be available for export.

1924–25 World Exports Estimated

An examination of the supply situation in each of the important exporting countries leads to the tentative conclusion that on the basis of present crop estimates and in view of the present outlook, something like 725 million bushels of wheat could be exported this year without reducing domestic reserves to an apprehensively low level.

We have come to this conclusion after a detailed study of the supplies available in each of the important exporting countries and a comparison of the rate of export during the first five months of this crop year with the rate during similar periods of other recent years. Before attempting to

[1] See Wheat Studies, No. 1, p. 19.

build up the world exportable surplus country by country, it is advisable to discover what is the customary rate of export during the portion of the crop year that has elapsed, and how this year's performance compares with the usual.

Estimate Based on Actual Exports, August to December

During the first five months of the crop year 1924–25, the five leading exporters—United States, Canada, Argentina, Australia, and British India—shipped out 345 million bushels of wheat and flour, the largest exportation in this period for any post-war year. As is indicated in Table 10, and more fully in Table 20 (p. 102), the international movement from these countries in the autumn of 1922 was almost as large, but the trade of other years since the war, even that of last year when the Canadian crop was so heavy, fell considerably short of these proportions. Broomhall's figures for shipments, summarized in Table 19 (p. 101), lend support to this conclusion.

In ratio to annual exportation the movement in these months has ranged between 40 and 49 per cent. The highest figure represents the experience of 1922–23, the year most nearly comparable to the present one; the lower figure, that of 1920–21. In attempting to arrive at an estimate for total exportation this year, clearly the experience of 1922–23 is of more value than that of the other years considered. As already pointed out, the distribution of supplies in the two years is very similar. The pressure on the market was considerably greater this year, however, than it was two years ago. It seems safe to assume, therefore, that at least 49 per cent of this year's exports had been made by January 1. Estimated on that basis, total exportation from these countries in 1924–25 would be about 700 million bushels.

Table 10.—Wheat and Flour Exports of Principal Countries, August to December, 1920–24, in Comparison with the Crop Year as a Whole

(Million bushels)

Crop year ending July 31	Exports August to December	Exports August to July	Percentage in first 5 months
1920–21	259	654	39.6
1921–22	311	657	47.3
1922–23	342	699	48.9
1923–24	325	753	43.2
1924–25	345	*704*[a]	49.0[b]

[a] Derived figure.
[b] Estimated.

This estimate applies only to the five leading exporting countries. The situation in Russia and the Danube countries has been so unsettled during the period that no reliance could be placed upon an estimate for this year based upon the performance of the past five years. The indications are, however, that not much more will be obtained this year from these sources than was obtained in 1922–23, when 11 million bushels were exported.

This leads to the conclusion that total exports for the year might be expected to be about 715 million bushels. For comparison, Broomhall's recent estimates, with corresponding figures for shipments in three preceding years, are given in Table 11.

Table 11.—Broomhall's Estimates of World Shipments of Wheat and Flour, Compared with Reported Shipments 1921–24*

(Million bushels)

Export area	Shipments 1921–22	Shipments 1922–23	Shipments 1923–24	Probable shipments 1924–25
United States	404	455	454	264
Canada				168
Argentina and Uruguay	118	138	174	144
Australia	111	48	78	92
British India	——	26	17	40
Russia and Danube Basin	6	7	36	12
Other countries	8	2	15	
Total	647	676	775	720

* Source: Broomhall's *Corn Trade News*. Estimates for 1924–25 revised to January 13, 1925.

Maximum Probable Net Exports Estimated at 725 Million Bushels

Studying the problem by exporting countries individually, we come to approximately the same conclusion.

Our results are summarized in Table 12 (p. 96), in comparison with reported exports of the preceding years and the November estimates of Sir James Wilson and

the United States Department of Agriculture.

We conclude that the maximum probable net exports in the crop year 1924–25 will be about 725 million bushels, and that actual exports will fall not far short of this figure. This estimate is distinctly higher than the earlier estimate of the United States Department of Agriculture, but considerably below Sir James Wilson's November estimate of world exportable surplus.

TABLE 12.—ESTIMATED NET EXPORTS OF WHEAT AND FLOUR, 1924–25, COMPARED WITH ACTUAL EXPORTS 1921–24*

(Million bushels)

Export area	Reported exports			Estimated exports, 1924–25		
	1921–22	1922–23	1923–24	Food Research Institute	U. S. Dept. of Agriculture	Sir James Wilson
United States	262	202	128	250	200–225	224
Canada	194	280	343	175	170–190	200
Argentina	118	139	172	135	130–150	168
Australia	115	50	86	110	75– 85	108
India	(14) [a]	29	20	40	25– 35	72 [b]
Russia and Danube Basin	21	8 [c]	48 [c]	15	10– 20	16
Algiers and Tunis	6	3	10			12 [d]
Total	702	711	807	725	610–705	800

* Sources: *International Crop Report and Agricultural Statistics* for reported exports; Sir James Wilson, *The World's Wheat, November 1924*, and *Foreign Crops and Markets*, November 26, 1924, for estimated exports. Sir James Wilson's estimates are for exportable surplus. United States figures are for net exports, July through June; Canadian figures for exports, September through August; other figures for crop years, August through July. See also NOTE below.

[a] Net imports.
[b] Includes probable surplus from harvest to be gathered May 1925.
[c] Excluding Bulgaria.
[d] "Other countries."

NOTE.—The dates at which these estimates were made is a matter of considerable importance, since the situation is constantly changing. Sir James Wilson's was probably made up early in November. That of the Department of Agriculture was published in November. Broomhall's[1] and our own were made up in January.

There are also certain fundamental differences in the meaning of the estimates. Sir James Wilson's is an estimate of the world "exportable surplus," and represents the maximum amount of wheat statistically available for export from this year's supply. It may be far above the actual exports of the year. Broomhall's estimate presented here represents his notion of the shipments likely to be made, during the year, but he puts the world exportable surplus at 812 million bushels, or some 92 million greater than his estimate of probable exports.[2] Our estimate and that of the U. S. Department of Agriculture are of probable exports, not exportable surpluses, though our own figure is better termed "maximum probable exports." The Department has given a range in the case of each country; and these when aggregated reach a total for the world considerably under ours or Broomhall's. In arriving at our final estimate, we have not used a range, although the final estimate is merely the mean of a range.

Certain other peculiarities in the tables must be pointed out. In Table 13 the reported and estimated exports of the United States are for the American crop year ending June 30, those of Canada are for her crop year ending August 31, while the others are for the international crop year ending July 31. The totals, therefore, are only approximations of the exports for the international crop year. This seemingly inconsistent policy has been followed because of the difficulty of estimating how much the United States will export next July, when a new and unknown crop will be on the market. Broomhall's figures are for the international crop year throughout.

Sir James Wilson believes (with Broomhall) that the American official trade statistics include much Canadian wheat in transit. This probably accounts in part for his relatively low estimate of the exportable surplus from this country. His very high estimate for India implies that he expects her to export very heavily—much more heavily than most observers think likely—in the months immediately following her 1925 harvest.

ESTIMATES COUNTRY BY COUNTRY

United States. If the American crop is not underestimated at 873 million bushels, it seems probable that wheat reserves will have to be pretty well drawn down by the end of the year to permit an export of 250 million bushels, the round figure we have used. In view of the price situation this

[1] See Appendix Table III for a summary of Broomhall's estimates since August 1.

[2] His total for the world exportable surplus agrees roughly with Sir James Wilson's, but his estimates country by country do not.

export does not seem improbable. In Table 13 our estimates of the disposition of this year's American crop are put down in detail.

TABLE 13.—UNITED STATES WHEAT SUPPLIES AND THEIR DISPOSITION*

(Million bushels)

	Approximations			Estimate
	1921–22	1922–23	1923–24	1924–25
Stocks, July 1	94	81	102	103
New crop	815	868	797	873
Supplies	909	949	899	976
Seed use	93	89	78	85
Feed and waste	471	555	94	45–55
Domestic milling			496	525
Stocks, June 30	81	102	103	60–75
Net exports, wheat and flour	262	202	128	235–260
Exports, July 1 to Dec. 31	190	134	84	178
Available for export, Jan. 1	72	68	44	57–82

* Based on official data for 1921–22, 1922–23, and 1923–24. Estimates for 1924–25 based so far as possible on official returns.

We have accepted the official estimate of the crop and carryover, and on that basis have a supply figure of 976 million bushels. Of this, 85 millions must be allowed for seed. By January 1, 178 million bushels of wheat and flour had left the country. The principal unknown elements of the problem are domestic consumption during the year and the reserve at the end. It is assumed that the remainder will be exported. Since domestic grinding has been at a high rate during the early months of the crop year, we have increased last year's estimate for milling by about 30 million bushels. On the other hand, we have decreased last year's feeding estimate (which was possibly too high) by a large percentage on the theory that, in spite of the poor corn crop, high wheat prices will greatly restrict wheat feeding this year. On this basis we still had for export, on January 1, 75 million bushels, more or less. If we export more than this, reserves will be extremely low at the end of the year. Of this total, at least half, in our opinion, may be exported in the form of flour.

NOTE.—The figure of 525 million bushels of wheat for estimated grindings for domestic consumption requires an explanation. It is of course a guess, but in the present condition of milling nothing else is possible. The monthly census of flour milling began July 1, 1923, and the data for the single year are not sufficient to afford the basis for estimating seasonal variation. The estimated grindings of that year, for exports and domestic consumption, were 574 million bushels, regarding the reporting mills as 82 per cent of the total. Of this, 36.4 per cent was ground in July–October. In July–October, inclusive, 1924, the grindings were 217 million bushels, regarding as accurate the census estimate that the reporting mills constitute 82 per cent of the total. If we estimate this 217 million bushels as 36.4 per cent of the total figure-to-be, as was the case last year, we suggest 1924–25 total grindings of 596 million bushels. Estimating the wheat exported in the state of flour as 70 million bushels, 526 million bushels would measure the grinding for domestic purposes. This is nearly 30 million bushels higher than last year's estimated consumption, a not abnormal increase. If mill operations for this year show less than the seasonal variation of last year, the final figure for grindings will be over 596 million bushels.

It is possible that under the conditions of rising wheat prices, high freight rates, and relative scarcity of wheat east of the Mississippi and west of the Rocky Mountains, the grindings of the reporting mills are more than 82 per cent of the total. This would mean that the census figure for total grindings would be higher, by an indeterminable amount, than the real figure.

Flour stocks on July 1 were regarded as low to moderate. There is evidence that some of the large baking concerns not only have contracted ahead for flour, but have accumulated certain stocks in advance of rising prices, and this receives some confirmation in the lag in the price of bread. There are no obvious indications that small bakers or households have stocked up on flour in anticipation of rise in price. Flour stocks are believed to be light in the distributing trade and light in the hands of millers, a hand-to-mouth relationship persisting between these two groups.

Nevertheless, there is the possibility that stocks have accumulated to some extent during the autumn months. With rising prices and the general public convinced of the persistence of the trend, some retailers and households may have laid by a few bags or barrels of flour. There are supposed to be something like 250,000 retailers of flour in the United States. Home baking is still supposed to use practically half the flour that goes into bread. A small accumulation, scarcely perceptible to mills and wholesalers, may have occurred during the first five months of the year, the effect to appear in reduction of demand at some time during the spring.

The effect of these two factors would both be in the direction of lowering the estimate. On

the other hand, there seems to be a general feeling that consumption of flour during this year has been on a distinctly higher level than last year. There is a general conviction in the milling trade that weekly flour grindings are passing directly into consumption, and that the business is on a hand-to-mouth basis which is expected to continue through the year. We have attempted to evaluate these guesses, and in a purely tentative manner have set down 525 million bushels as the wheat ground for domestic consumption; and in the exportable surplus of 250 million bushels are included some 70 million bushels exported in the state of flour.

The rate of marketing thus far this year has been far more rapid than in any of the war or post-war years. Receipts at primary markets (which constitute by no means the total marketing), from July to December, amounted to about 45 per cent of the year's crop, whereas the largest comparable figure for earlier post-war years was 34.[1]

Canada. Our estimate of the Canadian export is based primarily on an official estimate published November 19 by the Dominion Statistician. At that time there was considerable divergence of opinion as to the size of the crop and consequently of the exportable surplus; and since then the government has lowered its estimate of the crop by 10 million bushels. Nevertheless, in our opinion the distribution estimate of November 19 still appears substantially correct. We have decreased probable exports from 180 million to 175 million and have lowered the estimates of feed use and carryover at the end of the year. Otherwise the estimates in Table 14 below agree with those published by the Dominion Government last November.

On the basis of a supply of 290 million bushels (of which 28 was carryover), an export of 175 million bushels seems reasonable. The exportation in the early months of the year was somewhat behind this rate, but exports in December were heavy. Between September 1 and January 1, 99 million bushels of wheat and flour had been exported. Allowing for reserves of only 10 million bushels at the end of the crop year, this will permit a further exportation of 76 million bushels between January 1 and September 1, 1925.

The Canadian crop was late to be harvested, and consequently the marketing movement was delayed. By January 1, 111 million bushels, or 42 per cent of the crop, had been received at the head of the lakes. This compares with a marketing of 46 per cent of the crop in the same period of 1923, 48 per cent in 1922, and 40 per cent in 1920 (when the crop was more nearly comparable in size with this year's).[2]

TABLE 14.—CANADIAN WHEAT SUPPLIES AND THEIR DISPOSITION*

(Million bushels)

	Approximations			Estimate
	1921–22	1922–23	1923–24	1924–25
Stocks, Sept. 1	8	16	12	28
New crop	301	400	474	262
Supplies	309	416	486	290
Seed use	39	40	38	38[a]
Feed and waste	23	44	34	25
Domestic milling	37	41	42	42[a]
Stocks, Aug. 31	16	12	28	10
Exports, wheat and flour	194	280	343	175
Exports, Sept. 1 to Dec. 31	94	162	176	99[b]
Available for export, Jan. 1	100	118	167	76

* Approximations by Dominion Bureau of Statistics for 1921–24, and their official estimate of November 19, 1924, for 1924–25.

[a] Domestic milling and seed use estimated together as 80 million by Dominion Statistician. The separation is ours. We regard both figures as slightly low.

[b] As reported officially September through December.

The midwinter exports are likely to be relatively light because grain dealers, fearful of the policies of the wheat pool, did not build up the usual stocks at the eastern lake and seaboard terminals. Therefore, except for Canadian wheat in transit in the United States, Canadian exports may be low until lake navigation reopens.

Argentina. The estimates for Argentina are more tentative than those for North America, partly because all estimates are less dependable, partly because there is no official estimate of stocks as of August 1. We have used figures for past stocks obtained chiefly from Sir James Wilson's es-

[1] See Appendix Table V for details.

[2] See Appendix Table IV for weekly receipts of wheat at the head of the lakes.

timates, with certain adjustments. The 1924 crop figure is the current official estimate. It is fair to say that there is a notable divergence between the government estimate, the estimates of Le Count, an American expert on the ground, and those of Broomhall. We have raised somewhat the estimate for domestic use, to compensate for shortage in the crops of corn, oats, and flaxseed. The figure for exports from August 1 to January 1 is official. British buyers have made heavy advance purchases of Argentine wheat for February delivery.

TABLE 15.—ARGENTINE WHEAT SUPPLIES AND THEIR DISPOSITION*

(Million bushels)

	Approximations 1922–23	1923–24	Estimate 1924–25
Stocks, Aug. 1	51	42	54
New crop	196	247[a]	191
Available supplies	247	289	245
Domestic use	66	63	70
Stocks, July 31	42	54	40
Exports	139	172	130–140
Exports, Aug. 1 to Dec. 31	33	34	30
Available for export, Jan. 1	106	138	105

* Official statements of crops and exports. Stocks obtained by adding to Sir James Wilson's estimates of exportable surplus for August 1, 1922 and 1923 (respectively, 32 and 24 million bushels), and to Broomhall's estimate for August 1, 1924 (36 millions), 5½ of estimated annual use less allowance for seed.

a The revised figure of 257 millions was received too late to be used in this table.

On the whole, an export of 130 to 140 million bushels for the year ending July 31 seems probable. Of this about 105 would seem to be available for export after January 1.

Australia. The Australian crop is now estimated at 162 million bushels, and the crop is of excellent quality. Feed conditions are such as to permit a maximum export, and the stocks as of August 1 are reasonably known. With stocks of 27 million bushels and the new crop of 162 million, domestic use of 49 million, and outgoing stocks of 30 million, Australia has 110 million bushels to export for the year ending July 31. Exports to January 1 are estimated at 16 million bushels, leaving 94 million bushels to go out in the next seven months, an easy operation when one considers the numerous harbors of Australia and their

TABLE 16.—AUSTRALIAN WHEAT SUPPLIES AND THEIR DISPOSITION*

(Million bushels)

	1922–23	1923–24	Estimate 1924–25
Stocks, Aug. 1	23	33	27
New crop	109	126	162
Supplies	132	159	189
Domestic use	49	46	49
Stocks, July 31	33	27	30
Exports, wheat and flour	50	86	110
Exports, Aug. 1 to Dec. 31	9	22	16
Available for export, Jan. 1	41	64	94

* Official statement of crops and exports. Stocks obtained by adding to Sir James Wilson's estimates of exportable surplus (respectively 8, 16, and 12 million bushels), 5½ of estimated annual domestic use less allowance for seed.

loading facilities. Charters for movement of Australian wheat have been contracted for on a heavy scale, indicating prompt and large movement after the first of January.

India. Exports from India are especially problematical. Sir James Wilson in November estimated net exports of 72 million bushels, Broomhall estimates shipments of 40 million bushels for the crop year, the Department of Agriculture 25–35 millions. Basic data for consideration are shown in Tables 17 and 18 (p. 100).

Before the war India exports averaged 50 million bushels from an average crop of 352 million. During the war, however, wheat consumption increased, and consumption since has averaged higher than before the war. In the past two years prosperity in India and low prices for wheat have continued to stimulate domestic consumption. At the average consumption for the past two years, India's export surplus would be only about 20 million bushels. This year, while prosperity continues, high wheat prices make for reduced consumption and heavier exports. Provided next year's crop promises reasonable yields, the

level of domestic consumption may permit export of as much as 45 million bushels, and is likely to permit export of at least 30 million; but this is contingent upon the new crop outlook. According to Sir James Wilson, on August 1 the exportable surplus from the 1924 crop was 48 million bushels.

TABLE 17.—INDIA'S WHEAT CROP, EXPORTS, AND AVAILABLE SUPPLIES*

(Million bushels)

Year	Crop	Net export	Available supplies
1909–14 average	352	50	302
1919–24 average	329	10½	318
1919–20	280	2	278
1920–21	378	15	363
1921–22	250	(14) [a]	264
1922–23	367	29	338
1923–24	369	20	349
1924–25	364	40 [b]	324 [b]

*Source: See WHEAT STUDIES, No. 1, Appendix Tables I and X.
[a] Net import.
[b] Estimated.

TABLE 18.—INDIA'S NET EXPORTS OF WHEAT AND FLOUR, APRIL–OCTOBER, CROPS OF 1921, 1923, 1924*

(Thousand bushels)

Period	1921	1923	1924
April 1–July 31			
Wheat	2,566	18,267	12,013
Flour	1,726	825	1,158
Total	4,292	19,092	13,191
Aug. 1–Oct. 31			
Wheat	(581) [a]	3,429	8,779
Flour	798	726	692
Total	217	4,155	9,471
Grand total	4,509	23,247	22,662

*Source: *International Crop Report and Agricultural Statistics.*
[a] Net import.

Recent export figures tend to confirm expectations of the heaviest post-war export. Beginning with July, India's net exports have run higher than in 1921 or 1923, both years of good crops, evidently in response to high export prices. For the first seven months of India's crop year, the 1924–25 exports of wheat and flour were 22½ million bushels, as compared with 26 millions of net export in the entire crop year ending March 31, 1924, when prices were much lower. A net export of 40 million bushels for the year would leave domestic supplies above the average of the first five post-war years, but lower than those of the past two years.

Other Exporting Countries. Of the four Danubian countries normally classed as exporters—Roumania, Bulgaria, Hungary, and Jugo-Slavia, only Jugo-Slavia had a favorable crop last summer. Hungary, however, in spite of her small crop, has shipped a good deal of wheat and flour to Czecho-Slovakia and some to Poland and other countries; while Jugo-Slavia, in order to improve her trade balance, has exported to the limit. She has abolished her export duty on flour and has reduced it for wheat. The Bulgarian government on October 31 prohibited export, and is now importing wheat. Roumania, by doubling the tariff, has practically prohibited export. Russia, instead of exporting wheat, in accordance with predictions early in the season, is importing it. The net export movement from these countries up to November 1 was about 11.5 million bushels, according to official trade reports. Broomhall in his reports of shipments disagrees with these figures and estimates that only about 4.5 million bushels had been shipped from this region by January 1. Obviously an estimate for the year as a whole is difficult to make in view of the conflicting reports.

Those countries that were exporting fairly heavily early in the year had about ceased by January 1. It was even predicted that they would all be importing before the season is over. Russia may have import requirements of appreciable dimensions. In view of the uncertainties of the situation, we have allowed 15 million as the net export for the entire group of countries, considering this, however, a maximum figure. If Russia is forced to import for seeding, as was recently reported to be probable, this figure might have to be considerably reduced.

We have made no allowance for export from Northern Africa. French Morocco has exported only very small amounts thus far, while Algeria and Tunis are likely to be net importers rather than net exporters.

Heavy North American Shipments Feature the Period

As already indicated, there has been an extraordinarily heavy international trade in wheat during the first five months of the crop year. According to Broomhall, total shipments from all exporting countries were 12 million bushels heavier between August and December of this year than in the same months last year, and the movement then was considerably heavier than in earlier years. From October 11 to November 15, six weeks, the average weekly shipments to Europe were over 18.4 million bushels per week, a record in history. This rapid movement is to be accounted for by the pressure of continental countries for foreign wheat to compensate for the real or anticipated deficiencies in their own crops and in Canada. Table 19 shows the volume of shipments from leading exporting areas during the first five months of the crop year and their general destinations, as reported by Broomhall in *Corn Trade News*.

Table 19.—Broomhall's Estimates of International Shipments of Wheat, Pre-War and Post-War, for the Period August 1 to December 31*

(Million bushels)

Export area	5-yr. ave. 1909–13	1920	1921	1922	1923	1924
North America	98.5	199.9	216.2	239.1	206.8	241.6
Argentina and Uruguay	14.9	9.8	9.8	32.6	34.8	32.8
Australia	12.3	8.2	35.2	7.8	17.4	14.8
Russia, Danube and Black Sea	121.4	.1	2.5	2.6	25.8	4.8
British India	17.2	1.7	.2	3.8	5.4	15.6
Other countries	4.5	—	5.2	—	7.8	—
Total	268.8	219.7	269.1	285.9	298.0	309.6
Destination						
Europe	235.4	205.4	225.9	248.9	238.4	276.8
Ex-Europe	33.4	14.3	43.2	37.0	59.6	32.8
Percentage of year's total						
Total	43.2	37.2	41.6	42.3	38.5	43.0[a]
Europe	37.8	34.8	34.9	36.8	30.8	38.4[a]
Ex-Europe	5.4	2.4	6.7	5.5	7.7	4.6[a]

* Source: Broomhall's *Corn Trade News* The figures are totals of weekly shipments for the 22 weeks most closely approximating the period August 1 to December 31 in each year.

a Percentage of Broomhall's estimate of 720 million bushels.

As the table shows, North American shipments account for four-fifths of the trade of the period, and those from the United States probably for one-half. The American crop was harvested early, while the Canadian was not only poor but late in reaching the market. As a result, the early shipments from North America were mostly of United States origin. By November and December, however, Canadian exports had increased almost to the United States figures.

The official United States and Canadian trade returns agree only roughly with Broomhall's reports of shipments from North America. Canada, for instance, reports as exported at the time it crosses the border, wheat leaving her territory for Europe via United States ports; but this same wheat may not appear in Broomhall's reports of shipments until some weeks later when it leaves the Atlantic port.[1] Other differences, obscure and difficult to segregate, make it impossible to harmonize the two sets of figures. In Table 20 (p. 102) the official trade returns of the leading exporting countries for the first five months of this year are compared with those of other post-war years.

Large Visible Supplies as of January 1

In connection with the export outlook, it is pertinent to consider the size of wheat and flour stocks on January 1. Unfortunately statistics of stocks are too imperfect to permit close comparison or analysis.

World visible supplies ordinarily reach their peak about the turn of the year. This year the December 1 figures were of record size, disregarding figures swollen by war stocks. Indeed, for the past two years, world visible supplies have tended upward, each month recording a higher figure than the same month of the year before. Broomhall's figures for December 1, with comparisons, are given in Appendix Table III. This year's increase is largely in the United States, east of the Rocky Mountains, and in

[1] Cf. Wheat Studies, No. 1, p. 35.

some degree in Great Britain and afloat for orders. Canadian stocks, and United States west of the Rockies are relatively low.

Recently the tendency to increase stocks has been reversed. Weekly data show that the maximum this year was reached late in November, and that in December a considerable decline took place, contrary to the usual seasonal tendency. Bradstreet's figures for North American, British, and floating stocks, given below, in million bushels, illustrate quite clearly the recent movement in contrast with changes in corresponding periods of the previous three years:

	1921–22	1922–23	1923–24	1924–25
Nov.—last week	191.4	197.0	247.2	261.6
Jan.—last week	178.3	190.6	252.8	233.8
Percentage change	−6.8%	−3.2%	+2.3%	−10.6%

The recent reduction occurred both in the United States and in the "U. K. and afloat" stocks, and the increase in Canadian stocks was too small to offset the decreases elsewhere. Although visible supplies remain large, the decline is significant, and it is undoubtedly related to the pronounced upswing of prices in December.

The present large visible supplies facilitate the handling of milling and export contracts, but their existence in no way contradicts the evidence of a stringency in wheat supplies for the year as a whole. Broadly speaking, stocks are low in Russia, Spain, Italy, and the Balkans, and moderate in the rest of continental Europe. Farm reserves are quite low in the United States, considering the size of the crop and the time of the year. Invisible supplies of flour are considered moderate. High figures for visible supplies have a very different meaning when farm reserves are low instead of high. One must always consider the visible wheat with reference to what is behind it. There is, therefore, reason to expect a

Table 20.—Net Exports of Wheat and Flour from Principal Exporting Countries, August to December, Pre-War and Post-War*

(Million bushels)

Year	Total	United States	Canada	Argentina	Australia	British India
1909–13 average	158.8	57.7	52.3	17.4	12.6	18.8
1920	259.0	136.5	97.4	11.0	11.1	3.0
1921	311.1	160.4	109.8	9.0	38.7	(6.8) [a]
1922	341.8	118.7	176.1	33.1	9.2	4.7
1923	324.8	72.8	189.9	34.1	21.9	6.1
1924	344.8	172.1	109.7	30.5	15.6	16.9
Months, 1924						
August	49.0	21.0	11.0	8.4	5.6	3.0
September	63.7	38.9	14.6	5.2	3.4	1.6
October	85.3	53.1	19.4	5.9	2.0	4.9
November	77.9	34.8	31.1	3.8	2.8	5.4
December	68.8	24.3	33.6	7.0	1.9	2.0

* Sources: U S., *Monthly Summary of Foreign Commerce of the United States* and figures from the Dept. of Commerce; Canada, pre-war, *International Yearbook of Agricultural Statistics*, and post-war, *Report on the Grain Trade of Canada* and *Canadian Grain Statistics;* Argentina, Australia, and British India, *International Crop Report* supplemented by *Crops and Markets* for latest figures.

[a] Net imports.

Table 21.—Probable Exports, January to July, 1925*

(Million bushels)

Export area	Estimated exports 1924–25	Exported Aug.–Dec. 1924	Probable exports Jan.–July 1925
United States	250	172	78
Canada	175	110	65
Argentina	135	30	105
Australia	110	16	94
British India	40	17	23
Other countries	15	12[a]	3
Total	725	357	368

* Based on data in Tables 12 and 20. Figures for the United States and Canada are not entirely comparable with the others, since exports for the year are estimated for crop years ending June 30 and September 30, respectively.

[a] Estimated.

marked decline in visible supplies in the next few months, by far more than the usual seasonal amount.

Estimated Exportable Surplus, January 1, 1925

If it is accepted that 725 million bushels is a fair estimate of the maximum probable exports for the year, it may be concluded that on January 1 there were still available for export out of the 1924–25 crops some 368 million bushels. If our estimate is high, the latter figure must be reduced. It is highly improbable, however, that the exportable surplus was less than 350 million bushels on that date. Table 21 (p. 102) summarizes our conclusions.

V. THE UPWARD COURSE OF PRICES

The discussion of import requirements and exportable surpluses makes abundantly clear the causes of the striking increase in wheat prices between June and December, 1924. In part the increase represents a reaction from the abnormally low wheat prices of 1923–24, which were occasioned by bumper crops harvested in the face of a fairly weak European demand. For this reason, rising prices in 1924–25 would have accompanied a crop of normal size. The exceptional strength of the rise was due to the harvest of a crop below normal in size, and even more deficient in quality, occurring simultaneously with poor crops of leading wheat substitutes and with improvement in Europe's financial position and power to command wheat imports. A year of excessive supplies has been followed by a year in which the supplies can be stretched to meet requirements only at a price which attracts to market almost the maximum amounts available and restricts European requirements to a relatively low figure. The rise in prices is the more impressive because it has occurred in the months when usually, in North America and in Europe, wheat prices sink to the lowest level for the year.

For so pronounced a shift in position there are practically no precedents. Accordingly, there has been no safe basis for judging the level which wheat prices would reach,—either the relative strength of the price factors or their net effect. Hence the price increase has been interrupted by frequent recessions, in which the strength of the bullish forces has been repeatedly tested. At the price bulges, longs have sold for profits; at the price breaks, Europe has bought for import. The adjustment between the year's available supplies and requirements has been so close that prices have been exceedingly sensitive to new developments even of small dimensions. The higher the price, the wider have been the fluctuations and the more sensitive the market.

In this section we undertake to measure the extent of the rise in leading markets, to account for the short time fluctuations that have interrupted the general upward trend, to interpret the variation from one market to another, to touch upon the peculiarities in continental prices, and to appraise the outlook for prices in coming months.

Price Increases of 50 to 75 Per Cent

The upward movement of prices began well before the crop year opened, generally in May; and the rise was continuous through the ensuing months of the year. The following average monthly values of exported wheat, in cents per bushel, as reported by the Bureau of Foreign and Domestic Commerce, give a smoothed-out curve of the price increase in the United States:

June	July	Aug.	Sept.	Oct.	Nov.	Dec.
116	125	135	136	151	157	161

Table 22 (p. 104) summarizes the net change over this period, for leading grades in the chief exporting markets and in Liverpool, while weekly data are given in Appendix Table VII.

In the last week of May, prices in the leading exporting countries were not much

above a dollar a bushel, except for American spring wheat. In the seven months following, they advanced to about $1.76 a bushel or roughly 65 per cent. The rise has been greatest in those types of wheat that have been relatively scarcest,—namely, American red winter and high grade Canadian spring. It has been least in American spring wheat, which shifted from a "protected" to a competitive basis in the course of the period. In Liverpool, the increase was of comparable dimensions. An average of the prices of Canadian, American, Argentine, and Australian wheat quotations in that market for the last week of May comes to $1.26 a bushel, while a similar average for the last week of December is $1.99, indicating an increase in prices there of 58 per cent.

TABLE 22.—INCREASE IN WHEAT PRICES IN LEADING MARKETS, MAY TO DECEMBER, 1924

(Dollars per bushel)

Markets and grade	Last week in May	Last week in Dec.	Net increase
United States			
Farm price[a]	$ .97	$1.41	45%
No. 2 Hard, Kansas City	1.08	1.71	58
No. 2 Red, Chicago	1.09	1.86	71
No. 1 Dark Northern, Minneapolis	1.32	1.79	36
Canada			
No. 1 Manitoba, Winnipeg	1.05	1.86	77
Argentina			
Barletta, Buenos Aires	1.04	1.59[b]	53
Great Britain			
No. 1 Manitoba, Liverpool	1.23	2.07	68
Argentine Rosafé, Liverpool	1.21	1.96	62
Australian, Liverpool	1.28	1.96	53
Pacific White, Liverpool	1.31	1.95	49

a For 15th of the month.
b For second week in December.

While these and monthly prices show the extent of the rise and make possible a comparison of the prices of specific types of wheat in exporting and importing markets, more frequent quotations are necessary to follow the price trends in detail. For this purpose, Chart I has been prepared from daily quotations for wheat of the "nearest" future delivery in Chicago, Winnipeg, Buenos Aires, and Liverpool. In general, the future contract calls for the delivery of wheat of at least No. 3 grade, with adjustable premiums or discounts.

PRICE SWINGS EXPLAINED

Although the rate of increase in prices has differed somewhat from center to center, the up-swings and down-swings have usually been coincident in the principal wheat markets. Throughout this period conditions in the Northern Hemisphere have been of predominant importance. In the period immediately following the turn of the year, the Southern Hemisphere supplies are likely to dominate the market.

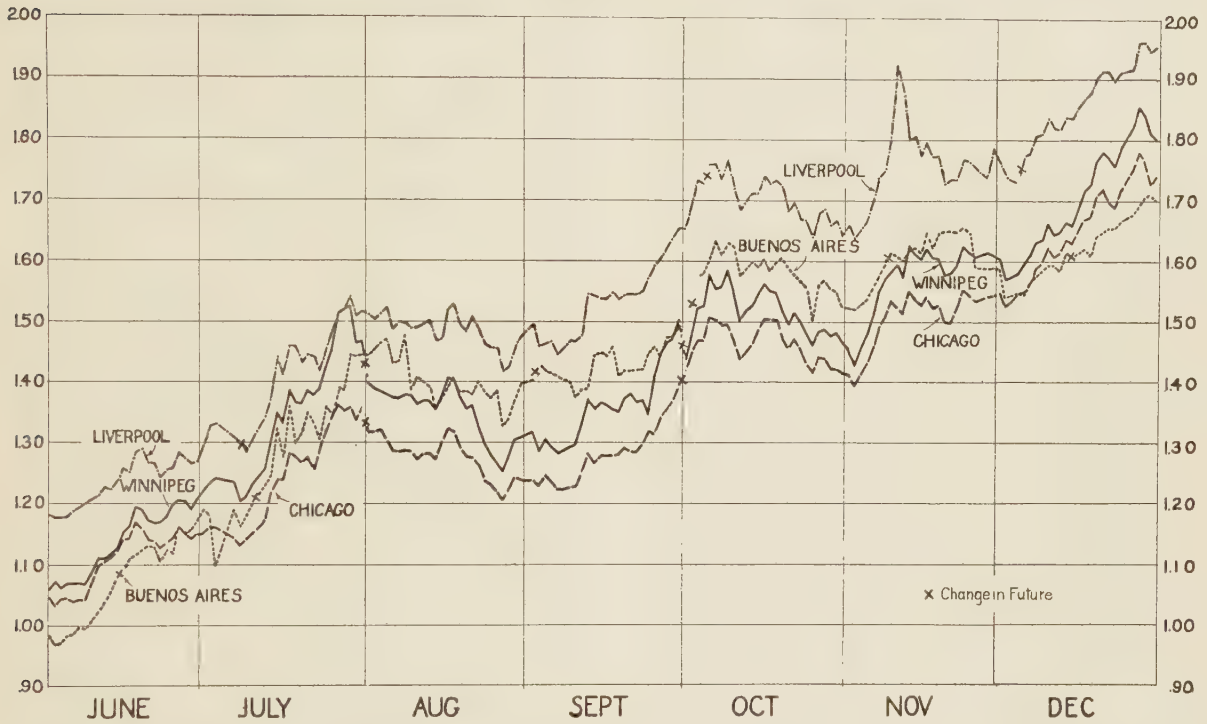
As the chart shows, the advance in prices was pretty consistent in all markets from the second week in June until the last week in July. During August there was a slump (most severe in Winnipeg and Chicago), followed in September and early October by a much more than compensating advance. The second week in October witnessed a definite "break," succeeded by a declining market until early November, when after the American election the market advanced strongly for a number of days. About November 10, another break occurred in the Liverpool price, but exporting markets were largely unaffected. The Chicago future quotation closed the month 19 cents higher than it was at the beginning. During December prices advanced fairly steadily in all markets, although less in Argentina than in the other three.

The rise in June and July was mainly the result of poor crop prospects. The June forecast of the United States Department of Agriculture, predicting a crop about 100 millions of bushels smaller than last year's, gave the market its first impetus. In the course of the next few weeks it became apparent that American conditions were much better, but developments elsewhere much less satisfactory. In Canada, early conditions were unpromising because of the late spring and consequent reduction in planted acreage, and in July drought developed on a serious scale. In southern Europe and Russia, as early as May, drought caused serious damage, while in the northern portion of the continent the weather later was too cloudy and rainy for the good of the crops. Large stocks from

the preceding crop were insufficient to meet the prospective deficit. It was because of these facts that prices, instead of "breaking" when American conditions were found to be better than anticipated, rose fairly steadily until the end of July.

Chart 1.—Future Prices of Wheat in Principal Markets, Daily, June–December, 1924*

(U. S. dollars per bushel)



* Sources: Winnipeg and Chicago prices from *Chicago Journal of Commerce;* Buenos Aires and Liverpool prices from *Journal of Commerce,* New York. Quotations for the nearest future.

In August, the American crop came on the market in huge volume. It was then clear that the winter wheat crop, especially that of hard wheat, was not only large but of good quality. In that one month 93 million bushels were delivered at primary markets, the largest monthly movement on record.[1] Although there was active buying on the part of foreign and domestic interests, prices slumped under the burden of supplies.

The strong upward movement in September was the outcome of frantic European buying, which set in when it was found that the quality of practically all the European crops was poor, that the grain was too wet for immediate use, and that the total world supply, because of the poor Canadian crop, was going to be less than had been anticipated. This upward movement was halted by the continued marketing of immense quantities of American wheat—82 millions were delivered at primary markets in September and 88 millions in October—combined with the fact that European crop conditions showed some improvement. The German Government reported the crops there as not so damaged as had been anticipated, while in France two unofficial crop estimates were issued which placed national output well above the official figure. By this time, the Canadian marketing movement was also under way and added further to the volume of current supplies,[2] and imported grain was abundant in European ports. Under

[1] See Appendix Table V for monthly receipts of wheat at American primary markets.

[2] New crop Canadian wheat began to be marketed in the last week of September. Appendix Table IV shows the rate of the movement.

these conditions European millers hesitated to buy foreign wheat at current prices; some European importers were forced to resell at lower prices much they had already bought, and their buying for immediate and future delivery declined. August exports from the United States and Canada amounted to 32 million bushels. In September this was increased to 54 millions, while the October exportation was 72 million bushels.

Between October and November, there was no important change in the statistical position, except that it became evident that the Argentine crop had suffered seriously from drought. The American election, however, was the signal to enter the market for many domestic buyers who had refrained from committing themselves. Europeans also renewed their earlier buying. In response to these influences and increased speculation in other lines, which unquestionably had a psychological effect on the wheat market, the American price was advanced 14 cents a bushel in 5 days, the other markets following. As a month earlier, a serious break followed in the Liverpool price when it was apparent that more supplies might be available than would be required. In the exporting markets, however, and especially in Argentina and Canada, prices rallied quickly because of the scarcity of their wheats. Receipts at American primary markets in November amounted to 60 million, at Fort William and Port Arthur to 43 million. American exports during the month were not so large as in October, but nevertheless totaled 35 million bushels. Canadian exports were 31 million bushels.

With the closing of lake navigation and bad weather throughout much of the wheat belt, the North American marketing movement declined greatly in December. At the same time shipments from the Southern Hemisphere had not got under way on an appreciable scale, and European demand, though less active in certain directions than it had been earlier in the season, was increased by buying on the part of Russia, Bulgaria, and other countries, which are normally classed among wheat exporters. These factors, combined with no improvement in the underlying statistical position which had not already been discounted in the market, pushed prices to the highest point of the season. The December crop estimate of the United States Department of Agriculture increased the last previous estimate by 17 million bushels, making a total output of 873 million bushels; but as the trade had anticipated a revision by at least this amount, its publication had practically no effect on the price. Nor did the announcement of an increase of 6½ per cent in the acreage planted to winter wheat in the United States. Toward the end of the month, however, there was a fairly pronounced break, probably attributable to profit-taking by speculators.

American Prices Below Canadian and Argentine Parity until December

In marked contrast with the situation last year, when American prices were pretty consistently above those of her competitors, during the first four months of this crop year they were lower than Canadian or Argentine prices.[1] The premium in favor of American spring wheat, as compared with Canadian, which resulted from shortage and tariff protection last year, was wiped out by August this year. Between that time and December, No. 1 Manitoba was consistently quoted at Winnipeg several cents a bushel above No. 1 Dark Northern at Minneapolis. Similarly, No. 2 Hard Winter at Kansas City was consistently cheaper than Argentine wheat at Buenos Aires.

In December, however, certain new influences came into play. The Argentine cash price declined to within a cent or two of the Kansas City quotation for Hard Winter, and the contract quotation at Buenos Aires, which is probably quite as significant in this connection, fell below the similar Chicago quotation. Late in the month, Rosafé sold as low as Hard Winter in England, despite the fact that it is esteemed a superior wheat. The spread between Minneapolis and Winnipeg prices also became

[1] By reference to the chart on p. 105 it will be seen that after July 4 the American quotation for future delivery was lower than the Argentine or Canadian.

somewhat narrower than in preceding months. The relatively low level of our prices for winter wheat during this period is explicable on the basis of quantity available,[1] but the difference in favor of Canadian spring wheat as compared with ours is more difficult to explain.

In view of the relative scarcity of the best grade of spring wheat, it is entirely natural that it should bring a higher price than other more abundant or less desirable grades. The extent of the Canadian premium, however, can only be explained by speculative operation and intrinsically higher quality. In October Winnipeg quotations were sometimes higher than the Liverpool figure for Manitoba, owing largely to the wide spread between No. 1 and No. 3, the latter being accepted on the Liverpool contract.

Table 23 summarizes the difference between the Kansas City and Buenos Aires average cash quotations and between the Minneapolis and Winnipeg average cash quotations in each of the past six months.

Comparable price relationships have existed in the Liverpool market, where

TABLE 23.—AVERAGE MONTHLY PREMIUM OF ARGENTINE AND CANADIAN CASH WHEAT OVER AMERICAN, JUNE TO DECEMBER, 1924*

(Dollars per bushel)

Month 1924	Argentine over American Winter	Canadian over American Spring
June	$ .04	($ .24) [a]
July	.10	(.11) [a]
August	.23	.02
September	.23	.08
October	.22	.06
November	.17	.10
December	.02 [b]	.02

*Quotations: Argentine, Tuesday average for Barletta at Buenos Aires; Canadian, Friday average for No. 1 at Manitoba; American Winter, average of daily quotations for No. 2 Hard at Kansas City; American Spring, similar average for No. 1 Dark Northern at Minneapolis.

[a] Premium in favor of Minneapolis.

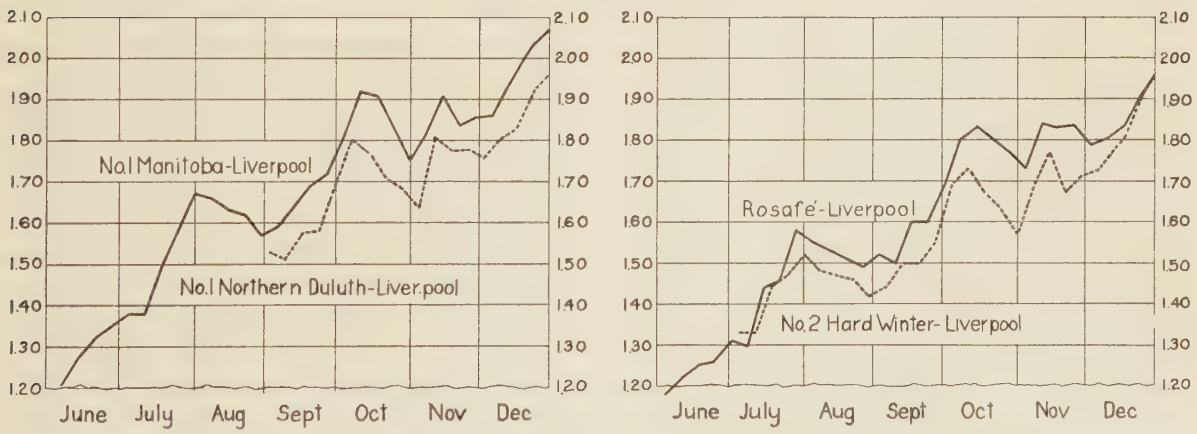
[b] Average difference in first two weeks in December.

late in the autumn, when Canadian wheat was available in large quantities. These relationships are graphically presented in Chart 2, showing the price of Duluth No. 1 Northern in comparison with that of No. 1 Manitoba, and No. 2 Hard Winter in comparison with Rosafé, all at Liverpool.

In comparing the levels of the different imported wheats in Liverpool during the autumn, it is clear that little importing was being done from the exporting countries whose wheats were quoted at the highest figure. The wheats were drawn instead from the countries whose wheats were

CHART 2.—COMPARISON OF CANADIAN AND ARGENTINE CASH PRICES OF WHEAT WITH AMERICAN, WEEKLY, JUNE–DECEMBER, 1924*

(U. S. dollars per bushel)



* Sources: Broomhall's *Corn Trade News* and *International Crop Report and Agricultural Statistics.*

American wheat (except Pacific) has consistently sold at lower prices than wheat from other countries. This was true even

[1] See WHEAT STUDIES, No. 1, pp. 42, 47, for discussion of usual relation of quantity marketed to price.

quoted lowest; for example, at one time Buenos Aires was 10 cents above New York, but New York was doing the exporting instead of Buenos Aires.

During the active period of American exporting in the fall, when the flow of Canadian wheat was delayed and Argentine exports represented the old crop, the c. i. f. prices of American wheat were lower than the corresponding prices of Canadian and Argentine wheats, though these continued to be exported. With the decline in the movement of American wheat in December, the increasing volume of Canadian export, and the approach of the movement of the new Argentine crop, the c. i. f. price of American wheat rose relative to the others and the three wheats reached parity in December for grades equal in British milling value, with occasional days when American wheat was higher than that of Canada and Argentina. One expects the c. i. f. price of North American wheat to shade that of the wheat of the Southern Hemisphere during the autumnal months, when the flow of export wheat of the Northern Hemisphere is heavy and that of the Southern Hemisphere light, the position to be reversed after the first of the year when the export movement from Argentina and Australia becomes heavy.

Variable Increases on the Continent

On the continent of Europe, prices of import wheats have advanced roughly *pari passu* with prices in the Liverpool market, if exchange rates are taken into account, subject to variations caused by overbuying and reselling of cargoes. Prices of domestic wheat, however, have varied not a little from prices of import wheat. Appendix Table VI indicates roughly the monthly movements in European domestic wheat prices, but more detailed figures alone bring out the peculiarities of the advance.

In France, for example, domestic wheat was relatively higher than import wheat in April, May, and June; but in succeeding months it rose less rapidly than foreign wheat, and since July has been consistently lower than most grades of import wheat. Late in May, domestic wheat was selling, f. o. b. provincial stations, around 95 francs a quintal, several francs above even the best grades of import wheats c. i. f. French ports. In the last week in November, with not very different values of the franc, domestic wheat was selling similarly around 120 francs a quintal, while import wheats commanded several francs premium.[1] Domestic wheat had therefore risen by about 26 per cent, while import wheat had risen about 44 per cent.[2] This variation is attributable partly to the relative exhaustion of domestic wheats late in the previous crop year, when import wheats were abundant, and partly to the fact that the new crop was fully available in November,—in short, to seasonal factors intensified by the small French crop of 1923 and the larger crop of 1924; but in part it must be attributed to the low quality of French wheat this year.[3]

The French market, and particularly the mills, have been much disturbed by changes in and uncertainties regarding government policies. The Paris *Bourse de Commerce* was closed from February 18 to August 4, and reopened under new regulations. The duty on wheat was re-established at 14 francs per quintal August 1, but in December a law was passed authorizing refunds of duties paid on foreign wheat used in flour for domestic purposes, and the turnover tax on breadstuffs was abolished. The government has attempted to fix not only rates of extraction, but flour prices as well. The government gave up the attempt to impose the extraction regulation on imported flour. Bread prices remain subject to local regulation, and are kept low in relation to flour and wheat prices. Reduced consumption is sought through restricting bakery hours. Latterly the War Ministry was voted 150 million francs for creating a breadstuffs reserve. These and other measures have aroused great opposition, and may yet be modified, in practice if not in law.

[1] Quotations in *La Meunerie Française.*

[2] The margin increased slightly in December, judging by the January *Bulletin d'Information* of the Association Générale des Producteurs du Blé.

[3] Similar reasons account for the relatively low Gazette price of British wheat, which sold in December at considerable discount under import prices, and rose much less between May and December.

German prices of bread grains and flour have fluctuated greatly throughout 1924. Table 24 shows successive high points and low points in weekly quotations on the Berlin market. In April, May, and June, prices sank, owing to low domestic consumption in the face of considerable stocks of domestic and imported grain and flour. During the summer, with poor prospects for domestic crops and with rising world prices, a tremendous rise took place, much greater in rye than in wheat. From the low point of June 24 to the high point of October 7, wheat prices increased 80 per cent, and rye prices 110 per cent. This was followed by a decline in October as prospects of tariff duties weakened, as threshing improved the outlook for domestic supplies, and as heavy reselling of import grain and flour took place. In November and December the market recovered. On the whole, throughout this period, German prices of bread grains and flour have been relatively low, in terms of dollars, and have risen less above the 1913 average than prices in foreign markets have risen, or than c. i. f. prices of imports.[1]

In Germany also, uncertainties regarding government policies have affected the market. In July the permission to export helped prices to recover, and the renewed prohibition of export on October 1 may have had some adverse influence. Fear of the imposition of import duties on grain and flour, proposed by the government in July, led to speculative buying, heavy imports, and higher prices in succeeding months. By October, when high prices had weakened the agitation for protective duties, the market was so overstocked that local banks were unable to finance millers, causing reduced demand and heavy resales by importers at a loss. Future trading, prohibited since July 1914, was permitted from December 1, 1924. Restrictions on bread prices and loaf weights were abolished early in November, and resulting price increases bid fair to restrict consumption and lessen demand for wheat.

In Italy, seasonal factors operated to cause a fall in domestic wheat prices in June and July,[2] but they have since risen sharply, as the shortage of the domestic crop was felt. An especially sharp rise in October was attributed to the apparently unexpected failure of Russia to deliver on grain contracts. On the whole, domestic wheats have risen as much as import wheats. Between June and December, the net increase was something like 45 per cent, and December prices were some 75 per cent higher than in December.[3]

TABLE 24.—BERLIN WHOLESALE PRICES OF WHEAT, RYE, AND FLOUR AT SELECTED DATES, 1924*

(Marks per quintal)

Date	Wheat	Rye	Wheat flour	Rye flour
1913 Average	19.52	16.25	26.90	20.85
1924 Jan. 29	14.85	12.80	23.75	21.29
Apr. 1	17.55	13.95	26.25	22.50
June 24	13.55	11.85	21.50	18.88
Oct. 7	24.50	24.90	35.38	35.38
Nov. 5	19.70	19.65	29.13	29.00

*Source: *Wirtschaft und Statistik.* Comparable later data not yet available.

These discussions are sufficient to indicate that while increases in wheat prices have been general, prices in individual countries have been so greatly influenced by domestic crops, by government policies, and by marked conditions that price movements have been far from uniform both in character and degree. They reveal important limitations upon the concept of a "world price" for wheat.

THE UNCERTAIN PRICE OUTLOOK

In considering the price outlook, it must be assumed that the current price represents a rough consensus as to the figure at which available supplies will meet requirements during the next few months, with unknown factors weighted according to the best information available. It cannot be assumed that this opinion is correct or will prove correct: the factors may change, or they may prove to have been incorrectly gauged. This year errors of judgment and

[1] See Table in *Wirtschaft und Statistik*, Nov. 12, 1924, p. 667. The same situation is shown by German indexes of commodity prices in general.

[2] The extension, July 1, of the suspension of the wheat import duty may also have had some influence.

[3] See Appendix Table VI, continuing Appendix Table XVIII, in WHEAT STUDIES, No. 1.

real changes in the situation, unless they offset one another, seem likely to influence prices in unusual degree, because of the close adjustment between supplies and requirements.

In the American speculative market there have been some decided differences of opinion, the Grain Marketing Company avowedly anticipating declining world prices with the marketing of crops of the Southern Hemisphere, and other groups as emphatically expecting a further pronounced rise culminating perhaps in May. Apparently the autumnal policy of the Canadian wheat pool was to hold for better prices. European importing interests are clearly nervous about the outlook, hoping without confidence that factors may develop to check or reverse the upward trend. There is abundant reason for uncertainty, and considerable fluctuations in prices may be expected, regardless of the trend over the period.

So far as the next few months are concerned, it must be noted that the seasonal tendency is upward. The average rise from December to May is something like 7 per cent in the United States and 3 per cent in Liverpool. In years of shortage of supplies, the seasonal tendency has frequently been intensified: witness the spring of 1898 and that of 1909. This has occurred even when the subsequent crops have been of good size, and when June and July prices receded sharply from the May levels. On the other hand, the price increase that has already occurred is much larger than has heretofore preceded pronounced upward movements between December and May.

With reference to future price developments in the world market, the measurement of world supplies is evidently clearer than the measurement of European effective demand. If Europe, during the spring, finds that it has been unable to make effective substitutions for the short bread-grain crop, a distressed import program might develop comparable to that of last September, when the acute stringency in the European supplies was first realized. A difference of 20 to 30 million bushels, in itself a relatively small part of Europe's annual requirements, added to or subtracted from the expected imports between April 1 and August 1, might exert a notable price influence upwards or downwards.

The experience of 1923–24 affords recent evidence of the fact that American prices are not invariably determined by the international price.[1] It is conceivable, as some observers believe, that American grain has been "overmarketed," and exported so heavily that domestic requirements in coming months will force prices here above the export level, as they were for spring wheat in much of 1923–24. American exports to January 1 were heavy enough to lend support to this theory.

The possibility of such a rise here is associated with scarcity of desired milling wheats after heavy exports have reduced the country practically to the domestic basis. It seems probable that April will find us reduced practically to the domestic basis, except for flour and for incidental grain exports. Cash premiums on desired milling grades of both hard and soft wheats indicate conditions of scarcity confronting buyers for the large mills. Up to January 1, Canada exported nearly 100 million bushels, mostly No. 3 and lower grades, leaving her probably 76 million bushels, containing much of the best wheat of the crop. Faced with consumers' demands for flour having little reference to price, American mills may have to import Canadian wheat duty-paid, comb the country for odd lots of good domestic wheat, or modify the blending formulas of trade-mark brands of flour. Under such circumstances, import of wheat into this country in the spring is possible, independent of the position of the foreign price except as the basis for the Canadian price plus duty, with transportation equalized.[1] Under present conditions severe milling competition is natural, irrespective of the export situation; but this may be intensified as the result of our heavy exports, which may restrict the buying facilities of the mills.

[1] See WHEAT STUDIES, No. 1, pp. 27, 28, 42.

[2] It is pertinent to remark that the tariff was raised from 30 to 40 cents a bushel on evidence of relative costs of production in 1923, when Canadian costs were exceptionally low. Relative costs of production for the 1924 crops justify no such rates of duty during the present crop year.

Our visible wheat supply is large, but the wheat behind visible positions is not large, if official reports of the size of the crop are to be trusted. American mills now do a great deal of buying in the country, and when these supplies fail, only the grain in terminal market remains. If the time should come when we are literally on a domestic basis and all salable supplies are in terminal markets, prices could hardly fail to rise above the world level.

In June and July, 1925, the price of wheat, and exports and imports during those months, will depend greatly upon the outlook for new crops. If good crops in the United States and Canada are in prospect, reserves may be safely allowed to fall to low levels, whereas if small or late crops are in prospect, the reserves will be maintained at a higher level even though prices are high. If Europe's crops promise well, importers' requirements will slacken and European reserves will be allowed to fall: whereas if crops promise to be poor, late, or both, imports will be normally heavier.

While it is much too early to speak confidently about the situation next June, it is clear that the higher prices of the present year have favored increased plantings of winter wheat. Furthermore, there is every reason to expect that prices in the spring will be sufficiently above the levels of recent springs to stimulate large plantings of spring wheat, also corresponding increases in the Southern Hemisphere. Average yields from enlarged acreage would produce a crop distinctly higher than that of 1924, though probably smaller than that of 1923. Allowing for an upward trend in wheat consumption, a world crop of 3,300 million bushels, excluding Russia, may well constitute a normal crop in 1925.

In any event, the present indications are that, with increased acreage and potentially average yields per acre next summer, the acute stringency in the wheat market will be relieved when the new crops are harvested, and that prices next year will be lower than the present level. The market's judgment on this point is reflected in the wide spread, in December, between May and July futures, as shown in Table 25. But it is much too early to appraise with confidence the outlook for next year's acreage, crop, or prices.

TABLE 25.—DISCOUNT OF JULY FUTURES UNDER MAY FUTURES IN DECEMBER QUOTATIONS IN CHICAGO, 1901–13, 1921–24*

Year	Per cent	Year	Per cent	Year	Per cent
1901	0.06	1907	6.0	1913	3.3
1902	3.7	1908	7.0		
1903	6.0	1909	8.7	1921	9.0
1904	11.3	1910	2.9	1922	7.7
1905	5.0	1912	3.2	1924	12.9
1906	0.9	1912	3.2	1924	12.9

* Source: *Daily Trade Bulletin*, Chicago, weekly averages, here averaged for the month.

There is no present prospect that next year's prices will fall to the low level of 1923–24. Even if the crop outlook proves favorable, carryovers will probably be very small. The chances are against the early repetition of such high yields per acre in 1925 as occurred in 1923. The trend of wheat requirements is clearly upward, and even as large a world crop as that of 1923 would be smaller in relation to requirements. A world price below the present level, but well above the average of 1923–24, is the present prospect for the year 1925–26.[1]

THE INFLUENCE OF SPECULATION

While the conditions here discussed thoroughly warrant a high level of wheat prices for the rest of the crop year, no one can say confidently what particular price level is warranted by the whole situation. The question turns chiefly upon the degree of intensity of Europe's demand,—upon what price will be necessary to restrict European imports to the limits imposed by availability of supplies. So far as the United States is concerned, there is the additional question how far, if at all, we have overmarketed, and may be pinched for domestic supplies in the later months of the crop year. No basis exists for determining these facts in advance of experience.

[1] If the present upward movement of the general price level should continue, and establish a level for 1925–26 distinctly higher than for 1923–24, the price of wheat may be expected to be affected by the monetary factors influencing the general price level as well as by the supply and demand factors peculiar to wheat.

Accordingly, the situation furnishes an attractive field for speculative activity, which has increased tremendously in recent months. In such periods as the present, the movement of market prices is therefore greatly influenced by purely speculative purchases and sales.

Grain exchange traders belong to four classes:

(1) Millers, merchants, and exporters who are hedging their business transactions,—selling future contracts as they buy for cash, and subsequently buying futures as they sell their grain or flour.

(2) Professional speculators who deal exclusively, or principally, in grain futures, who study supply and demand carefully and have a background of experience.

(3) Professional speculators who operate on grain exchanges only at intervals, dealing in sugar, cotton, lard, industrial stocks, wheat, and other cereals, passing from one exchange to the other to take advantage of unusual opportunities. These men have the psychology of the trading pit, but usually lack the technical knowledge of class (2), though having access to it.

(4) Amateur speculators, who appear on the grain exchanges only under unusual or abnormal circumstances. These have little knowledge of conditions. They are greatly influenced by the press, attempt to judge a movement by the behavior of professional speculators, and try to get on board with them.

Hedging operations have little influence on the trend of prices, except on a narrow market. Professional speculators base their operations on existing market conditions as they evaluate them. They do not create, but take advantage of the basal market conditions. Such speculation may influence price movements growing out of basal conditions of supply and demand. Since large operations occur mostly on a rising market, the effect of heavy professional trading is often to intensify a tendency,—to make the price rise somewhat faster or to drive it somewhat higher.

The influence of amateur trading is usually in the direction of price increase, since amateur speculators nearly always buy for a rise and rarely sell for a fall. Several times in recent months there have been indications, on the Chicago and Winnipeg exchanges, that amateur speculators, so to speak, took the market out of the hands of the professional dealers and drove prices up.

Price increases which take place under the influence of amateur and in-and-out professional speculators are frequently short-lived. Hence marked fluctuations in prices, with high profits and losses for individual speculators, usually accompany their presence in the wheat market. At such times prices are frequently above and again below the positions justified by underlying conditions of demand and supply. The markets this season afford ample illustration of these facts.

VI. CONCLUDING OBSERVATIONS

The main points of the foregoing discussion may now be briefly summarized.

(1) The world wheat crop (ex-Russia) available for the current crop year is a little over 3,100 million bushels, only slightly less than the crops for 1921 and 1922, but some 380 million bushels short of the 1923 crop. It is 400 million bushels below last year's crop plus Russia's net exports, of which none are expected this year. The wheat crop is of lower average quality than usual, so that a larger proportion, particularly in Europe, is unmillable or will yield less than the normal amount of flour per bushel. The world crop of rye, the other principal bread grain, is relatively shorter than the wheat crop.

(2) Crops of coarse grains are also below normal, as a whole, but crops of oil seeds are good. The rice and potato crops are of fair size, though European potato crops are generally of mediocre quality. Notable substitutions of potatoes for bread grains, and of oil seeds for feed grains, are taking place in Europe. Wheat substitutes, however, are not sufficiently abundant to offset the shortage of wheat and rye.

(3) The moderate improvement in Eu-

rope's financial position and economic outlook increases her ability to purchase import grain, but prevailing high prices are stimulating efforts to keep imports as low as possible. Europe's requirements for wheat imports, however, seem unlikely to be much less than 630 million bushels, which would give her a per capita breadgrain supply well below the post-war average. The wheat requirements of ex-European countries, which are much more responsive to price, may be expected not to exceed 80 or 90 million bushels,—far below last year's record imports and somewhat below common figures of other years. World import requirements are therefore likely to be around 710 million bushels, and will probably be higher rather than lower.

(4) The world exportable surplus of wheat for the year, allowing for reduced carryovers and smaller feeding use, is apparently not over 725 million bushels, and actual exports seem likely to approach this figure. Nearly 50 per cent of the estimated exports for the year had been shipped out by January 1, reflecting an unusually rapid rate of export. This is attributable partly to the fact that the largest surplus existed in the United States, where the harvest is earlier than in other large export areas, and partly to rapid marketing here. There is, therefore, only a narrow margin between maximum probable exports and minimum probable imports, even though Europe is taking large quantities of low grades of Canadian wheat.

(5) Wheat prices rose by upward of 50 per cent between May and December, in response to increasing recognition of the close adjustment between supplies and requirements. Because of this close adjustment and the high price level, prices are especially sensitive to changes of small dimensions in estimates of crops, importers' requirements, feed uses, and the like, and to temporary variations in importers' demands. In European countries, prices of domestic wheats have varied considerably from wheat prices in leading markets, owing chiefly to considerations of quality and to changes or prospective changes in government regulations.

(6) Though there are many uncertainties in the outlook, it is reasonable to expect that next year's crop will be larger than this year's, and that the acute stringency will be relieved by the next harvests. On the basis of present expectations, wheat prices in 1925–26 will be below the level now prevailing, but they are quite unlikely to fall to anything like the abnormally low level characteristic of 1923–24. Prices in June and July 1925 will be materially influenced by prospects for the 1925 crops.

The Outlook for 1925 Crops

Though no accurate forecast of the 1925 crops is possible for several months, a few words concerning the outlook are justified.

In the United States, winter wheat seedings are reported at 42.3 million acres, as compared with a revised figure of 39.7 million acres last year, an increase of 2½ millions, but a lower planted acreage than in any other post-war year except last year.

On the average some 11 per cent of the acreage planted is abandoned, but the percentage varies greatly from year to year. This year the condition was reported December 1 as 81 per cent of normal, considerably below the average figure of 88 plus, but higher than for the 1922 and 1923 crops, which suffered excessive abandonment. Though the December condition figure is by no means an index of spring abandonment, which is also greatly affected by winter developments and spring prices, low December condition figures tend to be followed by abandonment above average. Even the average percentage abandonment, however, would reduce next year's harvest area of winter wheat to 37.2 million acres, less than a million acres above last year's harvested area.

Since last year's yields per acre harvested were exceptionally good, there is no present reason to expect next year's winter wheat harvest to exceed last year's, if indeed it be as large. On the basis of 15 bushels to the acre, a harvested acreage of 37.2 million acres would give 538 million bushels, about 50 millions short of the 1924 crop.

For Europe, data on fall sowings are still too scanty to have much significance, but no pronounced change in acreage is indi-

cated by available information. In British India a 5 per cent increase is reported.

Marked increases in acreage, if they take place at all, must take place in spring wheat areas, notably in Canada and our own Northwest, or in the Southern Hemisphere. In view of prices and the price outlook, such an increase can be expected if the weather is ordinarily favorable for seeding.

The yield per acre will be the dominant factor in next year's crops, as always, and as to this no safe basis for forecast exists.

Consequences to Producers and Consumers

American wheat farmers have profited largely, this year, from a favorable combination of circumstances,—high yields per acre (produced therefore at low costs per bushel), of good quality wheat, salable at high prices because of crop shortages elsewhere. The great bulk of the crop was marketed by December 31, at distinctly profitable prices, though at an average price much below those now prevailing.

The result is a marked improvement in the wheat farmer's financial position and credit, shown in reduced indebtedness and increased purchasing power. In the outlook for next year, there is nothing to threaten a return of the depressing conditions of the past three seasons. The wheat farmer's emergency is ended. In a larger view, however, it must be emphasized that the process of agricultural readjustment, in the world at large, is by no means complete. Neither last year nor this year can be regarded as typical wheat years, in the United States or the rest of the world. In high production-cost areas particularly, continued readjustment must be undertaken.

In Canada, the increase in prices has been even greater than in the United States and, because of the later marketing, Canadian farmers have profited more largely from the rising prices. The average farm price per bushel in Canada is estimated at $1.20, as compared with 67 cents last year and 60–62 cents in 1912 and 1913. Canada's smaller crop has therefore brought the growers a slightly larger sum than last year's bumper yield, and probably a net profit instead of a small net loss.

In certain European countries the same is true. In others, however, decreases in quantity, quality, or both have apparently made the situation less favorable for grain growers than in the low-price year, 1923–24. High prices of wheat have temporarily checkmated agrarian agitation for higher tariffs on wheat and flour, and have led to reductions or suspensions of existing duties.

The full effect of the increase in wheat prices has not yet been felt by consumers, for bread prices are under control in several countries, and in general tend to lag more or less behind rising prices of wheat. Further advances seem inevitable, for bread of equivalent quality. Already the changes have led to numerous governmental investigations and to efforts to reduce the quality of bread. European bread is poorer as well as dearer than in recent years.

The root cause of the present situation, as impartial investigation shows, is the temporary ill-adjustment between wheat supplies and requirements. The same was true last year, when the other shoe pinched, —the consumer benefiting at the expense of the farmer. The basic difficulties are not properly chargeable to popular bogies such as the speculator or the middleman. Nor can they be prevented by legislative acts, administrative measures, or new forms of business procedure, though emergencies usually call attention to persisting opportunities for desirable improvements in many directions. In time such maladjustments tend to bring their own remedies, but the weather exerts an influence upon agricultural conditions from year to year far outweighing human decisions. Such a pronounced change as occurred this year is exceedingly rare.

Exceptional conditions such as those of 1923–24 and 1924–25 properly call for efforts to palliate the difficulties experienced by farmers or consumers, and there is ample room for considering whether abnormalities and instability in wheat prices cannot be reduced. But it is important that proposed measures be considered in the light of the underlying conditions, or they may prove ineffective or actually injurious to the community at large.

APPENDIX

TABLE I.—PRODUCTION OF LEADING CEREALS (EXCEPT WHEAT) AND POTATOES IN PRINCIPAL PRODUCING AREAS, PRE-WAR AND POST-WAR*

(*A*) RYE *(million bushels)*

Area	Average 1909–13	1919	1920	1921	1922	1923	1924 [a]
Northern Hemisphere[b]	1,014	[c]	603	840	848	913	740
United States	36	76	61	62	103	63	64
Europe (ex-Russia)	976	[c]	532	757	713	827	663
France	53 [d]	31	34	44	38	37	40
Spain	28	23	28	28	26	28	30
Germany	368 [d]	240	194	268	206	263	226
Czecho-Slovakia	64 [d]	33	33	54	51	53	46
Hungary	31 [d]	[c]	21	23	25	31	23
Poland	219 [d]	[c]	74	168	197	235	151

(*B*) CORN *(million bushels)*

Area	Average 1909–13	1919	1920	1921	1922	1923	1924 [a]
World	3,904	3,962	4,437	4,076	3,972	4,300	[c]
United States	2,712	2,811	3,209	3,069	2,906	3,054	2,437
Italy	103 [d]	86	89	92	77	89	98
Hungary	61 [d]	[c]	50	32	49	49	80
Jugo-Slavia	112 [d]	[c]	101	74	89	81	106
Bulgaria	26 [d]	[c]	21	16	16	27	27
Roumania	193 [d]	141	182	111	111	151	157
Argentina	192	224	259	230	176	277	[c]

(*C*) OATS *(million bushels)*

Area	Average 1909–13	1919	1920	1921	1922	1923	1924 [a]
World (ex-Russia)	3,551	[c]	3,606	3,111	3,375	3,854	[c]
Northern Hemisphere (ex-Russia)	3,447	[c]	3,517	3,046	3,285	3,742	3,640
United States	1,143	1,184	1,496	1,078	1,216	1,306	1,542
Canada	352	394	531	426	291	564	412
Europe (ex-Russia)	1,927	[c]	1,478	1,509	1,551	1,834	1,658
United Kingdom	207	249	220	201	199	194	207
France	368 [d]	180 [e]	291	244	288	337	296
Germany	527 [d]	310 [e]	332	345	277	421	390
Poland	196 [d]	[c]	129	150	176	243	177
Argentina	54	57	48	31	56	81	51
Australia	18	16	23	15	19	18	[c]

(*D*) BARLEY *(million bushels)*

Area	Average 1909–13	1919	1920	1921	1922	1923	1924 [a]
World (ex-Russia)	1,315	[c]	1,157	1,149	1,203	1,331	[c]
Northern Hemisphere (ex-Russia)	1,301	[c]	1,138	1,130	1,178	1,299	1,200
United States	185	148	189	155	182	198	188
Canada	45	56	63	60	72	77	91
Europe (ex-Russia)	701	[c]	551	566	603	671	582
United Kingdom	65	60	68	56	56	53	59
Spain	75	82	90	89	78	112	60
Germany	134 [d]	88 [e]	82	89	74	108	110
Poland	69 [d]	[c]	39	56	60	76	57
North Africa	98	70	57	109	57	106	84
India	145	130	150	117	146	145	145
Japanese Empire	124	128	124	121	116	100	111

* For sources and notes, see next page.

TABLE I.—PRODUCTION OF LEADING CEREALS (EXCEPT WHEAT) AND POTATOES IN PRINCIPAL PRODUCING AREAS, PRE-WAR AND POST-WAR* *(Concluded)*

(*E*) RICE *(thousand short tons of cleaned rice)*

Area	Average 1909–13	1919	1920	1921	1922	1923	1924 [a]
World [h]	55,300	64,000	59,000	64,000	66,500	60,000	[c]
United States	330	583	723	522	575	468	472
Spain	150	206	197	178	187	165	150
Italy	323	331	307	321	316	354	374
India	32,072	35,821	30,981	37,139	37,762	31,694	[c]
Japan	7,894	9,553	9,925	8,668	9,533	8,713	9,132
Formosa	706	773	761	782	855	764	750
French Indo-China	3,666	3,266	3,142	3,966	3,947	3,606	3,850
Siam	2,724	3,430	3,329	2,903	2,977	3,013	[c]
Ceylon	238	244	240	247	261	148	173
Philippine Islands	583	1,044	1,124	1,282	1,340	1,351	1,342
Java and Madura	3,590	4,899	4,174	3,680	4,494	4,764	5,200

(*F*) POTATOES *(million bushels)*

Area	Average 1909–13	1919	1920	1921	1922	1923	1924 [a]
United States	358	323	403	362	453	416	455
Canada	78	126	134	107	93	92	97
England and Wales	100	102	119	110	150	103	99
Netherlands	104	127	122	107	162	90	99
Belgium	108	104	83	72	145	104	87
France	489 [e]	313	428	305	465	364	559
Spain	113 [f]	101	108	102	109	95	89
Germany	1,374 [d]	761	1,024	961	1,494	1,197	1,338
Czecho-Slovakia	[c]	84	184	159	333	229	228
Poland	449 [g]	386	665	617	1,240	974	1,004

* Sources: U. S. Dept. of Agric., *Yearbooks*, chiefly 1923; and *Foreign Crops and Markets*. Data derived largely from official estimates reported to International Institute of Agriculture, supplemented or modified in certain instances by Department of Agriculture estimates or adjustments.

a Data for 1924 are preliminary, hence especially subject to change.

b This total includes every country in the Northern Hemisphere whose production is of any size, except Russia, for which the pre-war estimated output for present territory is 776,198,000 bushels. The Southern Hemisphere production is of minor importance, the pre-war average being about 2½ million bushels and 1923–24 probably less than 5 million bushels.

c Data lacking or incomplete. *d* U. S. Dept. of Agric. estimate for present territory. *e* Pre-war boundaries.

f Two-year average. *g* Preliminary estimate for former Russian territory within 1923 boundaries.

h Exclusive of China, where a normal crop is around 30 million short tons. A prominent Chinese authority has estimated the 1923 crop at 25 million tons.

TABLE II.—APPARENT DOMESTIC UTILIZATION OF WHEAT (DISREGARDING CARRYOVERS) IN VARIOUS COUNTRIES, PRE-WAR AND POST-WAR*

(Million bushels)

(*A*) PRINCIPAL EXPORTING COUNTRIES

Year ending July 31	United States	Canada	Argentina	Australia	British India	Roumania	Hungary	Bulgaria	Jugo-Slavia	Algeria and Tunis	Morocco [a]
1909–14 ave.	579.9	101.1	62.4	22.3	302.0	[b]	[b]	[b]	[b]	36.9	16.7
1920–21	514.6	95.3	92.5	57.0	362.8	59.9	38.3	28.2	39.2	20.6	17.9
1921–22	563.7	114.2	72.9	14.5	264.2	75.1	43.3	24.7	47.9	40.0	22.5
1922–23	668.0	118.8	56.4	59.0	338.4	90.4	49.5	[d]	43.5	17.6	14.0
1923–24	670.6	126.0	74.8	39.9	349.1	99.8	50.9	[d]	55.8	36.0	19.8
1920–24 ave.	604.2	113.6	74.2	42.6	328.6	81.3	45.5	—	46.6	28.6	18.5

* Sources: Production figures, U. S. Dept. of Agric. *Foreign Crops and Markets;* trade figures, *International Yearbook of Agricultural Statistics* and *International Crop Report.*

a Net imports estimated. *b* Trade figures comparable with post-war years not available.

d Trade figures not available.

TABLE II.—APPARENT DOMESTIC UTILIZATION OF WHEAT (DISREGARDING CARRYOVERS) IN VARIOUS COUNTRIES, PRE-WAR AND POST-WAR* *(Concluded)*

(Million bushels)

(*B*) PRINCIPAL IMPORTING COUNTRIES

Year ending July 31	United Kingdom	France	Germany	Italy	Belgium	Netherlands	Switzerland	Spain	Portugal [a]	Denmark
1909–14 ave.	277.3	361.2 [c]	219.9 [c]	236.3 [c]	65.4	27.5	20.2	136.6	12.0	11.8 [c]
1920–21	256.9	305.2	142.4 [e]	240.7	42.5	24.9	16.5	158.4	10.4	7.8
1921–22	282.0	340.6	177.3 [e]	294.6	55.0	28.4	16.8	153.2	9.5	15.2
1922–23	277.1	288.9	109.4 [e]	277.3	50.1	30.1	18.9	125.3	9.8	15.5
1923–24	295.2	328.6	137.3 [e]	294.6	53.7	32.9	20.7	[d]	13.0	18.0
1920–24 ave.	277.8	315.8	141 6 [e]	276 8	50.3	29.1	18.2	145.6 [f]	10.7	14.1

Year ending July 31	Sweden	Norway	Austria	Czecho-Slovakia	Poland	Latvia, Esthonia,[a] and Lithuania	Finland	Greece	Egypt	Japan
1909–14 ave.	15.2	4.1	71.6 [c]	[b]	[b]	[b]	[b]	[b]	33.7	29.2
1920–21	16.9	4.8	20.0	44.7	[d]	4.6	2.7	21.8	42.9	36.0
1921–22	16.2	6.1	25.5	50 3	38.6	6.1	3.8	24.9	43.8	53 5
1922–23	18.2	7.5	20.8	43.9	45.0	8.0	5.8	26.9	44.3	42.1
1923–24	24.0	6.7	27.1	57.4	50.7	8.9	5.6	32.2	49.2	108.7
1920–24 ave.	18.8	6.3	23 4	49.1	44.8 [g]	6 9	4 5	26.4	45.0	60.1

* Sources: Production figures, U. S. Dept. of Agric. *Foreign Crops and Markets;* trade figures, *International Yearbook of Agricultural Statistics* and *International Crop Report.*

a Net imports estimated. *b* Trade figures comparable with post-war years not available.

c Pre-war boundaries. *d* Trade figures not available.

e These figures are too low, as the official crop figures for post-war years are known to be underestimated and net imports are incomplete because of territories occupied by foreign armies.

f 1920–23 average. *g* 1921–24 average.

TABLE III.—BROOMHALL'S ESTIMATES OF VISIBLE WHEAT SUPPLIES ON DECEMBER 1, 1919–24, COMPARED WITH PRE-WAR AND POST-WAR AVERAGES*

(Million bushels)

	1919	1920	1921	1922	1923	1924	1910–14 5-yr. ave.	1919–23 5-yr. ave.
United States—wheat								
East of Rockies	136.5	78.1	96.2	112.0	119.9	154.2	95.8	112.7
West of Rockies	5.5	3.6		3.7	8.2	4.5	6.3	
Canada—wheat	41.4	51.2	76.3	89.0	110.2	76.8	34.4	73.6
U. S.—flour as wheat	10.9	10.4	11.7	9.7	11.2	10.0	9.6	10.8
Canada—flour as wheat	.3	.7	.3	.3	.3	.3	.7	.4
Total	194.6	144.0	184.5	214.7	249.8	245.8	146.8	197.5
Argentina	3.3	.2	3.1	3.0	3.0	4.4	0.5	2.5
Australia	79.2 [a]	6.5	6.8	[b]	1.0	[b]	[b]	[b]
Total	82.5 [a]	6.7	9.9	[b]	4.0	[b]	[b]	[b]
United Kingdom—wheat	5.4	28.2	8.1	3.5	6.3	13.0	14.9	10.3
United Kingdom—flour as wheat	5.4	3.4	3.0	1.0	1.4	1.3	3.6	2.8
Afloat for United Kingdom	11.2	6.8	10.3	16.0	15.9	13.6	13.0	12.0
Afloat for Continent	34.9	27.3	20.7	34.6	28.4	28.3	16.1	29.2
Afloat for orders	21.1	2.6	11.5	5.7	7.5	17.3	6.9	9.7
Total	78.0	68.3	53.6	60.8	59.5	73.5	54.5	64.0
Grand total	355.1 [a]	219.0	248.0	[b]	313.3	[b]	[b]	[b]
Excluding Australia	275.9	212.5	241.2	278.5	312.3	323.7	201.8	264.1

* Source: Broomhall's *Corn Trade News.* *a* Exceptional figures due to Australian war stocks. *b* Data incomplete.

TABLE IV.—WHEAT RECEIPTS AT PRIMARY MARKETS IN THE UNITED STATES, AND AT FORT WILLIAM AND PORT ARTHUR, CANADA, WEEKLY, AUGUST TO DECEMBER, 1924*

(Thousand bushels)

Week ending	United States primary markets	Week ending	Fort William and Port Arthur	Week ending	United States primary markets	Week ending	Fort William and Port Arthur
Aug. 2	17,522	Aug. 1	1,920	Oct. 18	20,109	Oct. 17	9,575
Aug. 9	22,861	Aug. 8	1,008	Oct. 25	19,851	Oct. 24	8,926
Aug. 16	22,319	Aug. 15	508	Nov. 1	19,092	Oct. 31	9,731
Aug. 23	21,889	Aug. 22	188	Nov. 8	17,052	Nov. 7	10,762
Aug. 30	20,078	Aug. 29	425	Nov. 15	13,612	Nov. 14	10,237
Sept. 6	19,450	Sept. 5	437	Nov. 22	13,366	Nov. 21	10,270
Sept. 13	20,371	Sept. 12	571	Nov. 29	13,291	Nov. 28	10,695
Sept. 20	18,880	Sept. 19	858	Dec. 6	14,180	Dec. 5	11,291
Sept. 27	17,536	Sept. 26	2,007	Dec. 13	9,227	Dec. 12	7,080
Oct. 4	17,515	Oct. 3	6,618	Dec. 20	6,736	Dec. 19	4,310
Oct. 11	20,475	Oct. 10	11,005	Dec. 27	4,789	Dec. 26	2,306

* Sources: U. S.—*Price Current-Grain Reporter;* Fort William and Port Arthur—*Canadian Grain Statistics.*

TABLE V.—WHEAT RECEIPTS AT PRIMARY MARKETS IN THE UNITED STATES, AND AT FORT WILLIAM AND PORT ARTHUR, CANADA, MONTHLY, CROP YEARS, 1920–25*

(Million bushels)

Month	United States primary markets					Fort William and Port Arthur					Month
	1920–21	1921–22	1922–23	1923–24	1924–25	1920–21	1921–22	1922–23	1923–24	1924–25	
Aug.	39.6	68.6	60.6	65.3	93.0	—	3.2	3.7	2.0	1.3	Aug.
Sept.	42.7	61.4	57.7	45.3	82.1	12.6	27.5	37.0	28.3	7.1	Sept.
Oct.	44.6	41.6	48.3	40.5	88.0	32.0	46.2	65.1	67.0	40.9	Oct.
Nov.	37.2	25.6	42.5	37.2	60.5	33.4	40.8	56.8	72.5	42.7	Nov.
Dec.	31.6	24.0	45.3	28.4	[c]	27.9	23.0	32.0	51.9	20.3	Dec.
Total 5 mos.	195.7	221.2	254.4	216.7	323.6 [a]	105.9 [a]	140.7	194.6	221.7	112.3	Total 5 mos.
Jan.	29.0	17.5	37.6	15.9	—	7.8	7.7	11.6	12.7	—	Jan.
Feb.	21.2	22.7	21.6	19.8	—	4.5	4.2	3.2	3.9	—	Feb.
Mar.	22.6	20.2	21.7	18.0	—	4.4	9.0	6.0	2.5	—	Mar.
April	23.3	15.6	21.9	10.1	—	3.7	6.1	7.6	6.4	—	April
May	27.0	29.1	16.7	15.4	—	4.4	11.7	10.6	15.8	—	May
June	30.2	21.0	18.2	16.4	—	3.6	5.6	6.9	21.2	—	June
July	62.0	39.5	33.8	35.1	—	4.2	5.4	6.0	13.1	—	July
Total 7 mos.	215.3	165.6	171.5	130.7	—	32.6	49.7	51.9	75.6	—	Total 7 mos.
Grand total	411.0	386.8	425.9	347.4	—	138.5 [b]	190.4	246.5	297.3	—	Grand total

* Sources: U. S. Department of Commerce, *Survey of Current Business;* Fort William and Port Arthur, *Canadian Grain Statistics.* [a] Four months. [b] Eleven months. [c] Not available.

TABLE VI.—AVERAGE PRICES OF DOMESTIC WHEATS IN EUROPEAN MARKETS, MONTHLY, 1923–24*

Month	Great Britain	France (Chartres)	Italy (Milan)	Germany (Berlin)	Great Britain	France (Chartres)	Italy (Milan)	Germany (Berlin)	Month
	s. d. per quarter	*francs per quintal*	*lire per quintal*	*gold mks per quintal*	*U. S. dollars per bushel* [a]				
1924 Apr.	45–3	92.25	112.88	17.36	1.23	1.55	1.36	1.12	Apr. 1924
May	46–11	92.50	112.90	16.20	1.28	1.46	1.36	1.05	May
June	48–5	97.65	111.62	14.49	1.31	1.40	1.32	.94	June
July	51–11	97.25	106.88	16.51	1.42	1.36	1.25	1.07	July
Aug.	54–9	101.00	116.00	19.88	1.54	1.50	1.40	1.29	Aug.
Sept.	51–10	106.70	125.25	22.51	1.45	1.54	1.49	1.46	Sept.
Oct.	54–0	113.45	149.20	22.65	1.52	1.62	1.77	1.47	Oct.
Nov.	54–3	119.05	155.50	21.19	1.56	1.71	1.83	1.37	Nov.
Dec.	52–6	120.31	162.75 [b]	[c]	1.54	1.77	1.92 [b]	[c]	Dec.

* Sources: Great Britain, London *Economist;* France, U. S. Federal Reserve Board; Italy, *International Crop Report and Agricultural Statistics;* Germany, *Wirtschaft und Statistik.*
[a] Conversions made at average exchange rates for the month. [b] Average for first 2 weeks of December. [c] Not available.

TABLE VII.—WEEKLY CASH PRICES OF REPRESENTATIVE WHEATS IN LEADING EXPORTING AND IMPORTING MARKETS, JUNE TO DECEMBER, 1924*

(U. S. dollars per bushel)

Month	United States			Canada	Argentina	Liverpool					Month
	No. 2 Red Winter (Chicago)	No. 2 Hard Winter (Kansas City)	No. 1 Dark Northern (Minneapolis)	No. 1 Manitoba (Winnipeg)	Barletta (Buenos Aires)	No. 1 Manitoba	Argentine Rosafe	Australian	Pacific White	No. 2 Winter	
June	[a]	1.03	1.29	1.06	1.03	1.21	1.18	1.28	1.31	[a]	June
	1.09	1.05	1.31	1.09	1.08	1.27	1.22	1.30	1.32	[a]	
	1.17	1.13	1.42	1.16	1.17	1.32	1.25	1.33	1.39	[a]	
	1.15	1.13	1.43	1.18	1.18	1.35	1.26	1.33	1.42	[a]	
July	1.16	1.14	1.45	1.21	1.20	1.38	1.31	1.35	1.45	1.33	July
	1.16	1.10	1.42	1.24	1.21	1.38	1.30	1.37	1.36	1.33	
	1.29	1.18	1.48	1.47	1.32	1.49	1.44	1.47	1.53	1.44	
	1.33	1.21	1.49	1.47	1.34	1.58	1.46	1.52	1.57	1.47	
	—	—	—	—	—	—	1.58	—	—	—	
Aug.	1.34	1.24	1.52	1.49	1.46	1.67	1.55	1.57	1.61	1.52	Aug.
	1.32	1.22	1.50	1.49	1.45	1.66	1.53	1.61	1.63	1.48	
	1.31	1.20	1.42	1.47	1.38	1.63	1.51	1.55	1.59	1.47	
	1.33	1.20	1.40	1.37	1.41	1.62	1.49	1.55	1.58	1.46	
	1.28	1.14	1.35	1.39	1.40	1.57	—	1.53	1.57	1.42	
Sept.	1.29	1.16	1.32	1.36	1.42	1.59	1.52	1.57	1.57	1.44	Sept.
	1.28	1.16	1.32	1.43	1.42	1.64	1.50	1.64	1.61	1.50	
	1.35	1.21	1.37	1.44	1.44	1.69	1.60	1.66	1.64	1.50	
	1.39	1.24	1.39	1.52	1.46	1.72	1.60	1.68	1.68	1.55	
	—	—	—	—	—	—	1.68	—	—	—	
Oct.	1.52	1.34	1.46	1.57	1.57	1.81	1.80	1.74	1.74	1.69	Oct.
	1.56	1.40	1.54	1.62	1.57	1.92	1.83	1.82	[a]	1.73	
	1.56	1.38	1.51	1.66	1.63	1.91	1.80	1.78	1.81	1.67	
	1.53	1.37	1.53	1.55	1.60	1.83	1.77	1.77	1.78	1.63	
	1.49	1.33	1.47	1.51	1.56	1.75	—	1.79	1.74	1.57	
Nov.	1.48	1.33	1.44	1.67	1.59	1.82	1.73	1.79	1.74	1.68	Nov.
	1.51	1.46	1.59	1.67	1.65	1.91	1.84	1.87	[a]	1.77	
	1.59	1.46	1.59	1.64	1.61	1.84	1.83	1.86	1.77	1.67	
	1.66	1.49	1.60	1.65	1.60	1.85	1.84	1.85	1.83	1.71	
Dec.	1.66	1.51	1.62	1.64	1.54	1.86	1.79	1.87	1.83	1.73	Dec.
	1.73	1.57	1.67	1.69	1.59	1.93	1.80	1.89	1.85	1.78	
	1.80	1.64	1.74	1.80	[c]	1.97 [b]	1.83	1.91 [b]	1.88 [b]	1.80 [b]	
	1.86	1.71	1.79	1.86	[c]	2.04 [b]	1.90	1.94 [b]	1.90 [b]	1.90 [b]	
	—	—	—	—	—	2.07 [b]	1.96	1.96 [b]	1.95 [b]	1.96 [b]	

* Sources: U. S. prices from U. S. Dept. of Agriculture, *Crops and Markets;* foreign prices from *International Crop Report and Agricultural Statistics,* except Rosafé, which is from Broomhall's *Corn Trade News.* U. S. prices are weekly averages of daily weighted prices for weeks ending Friday. Foreign prices are for Friday of each week, except Rosafé, which is for Tuesday.

[a] No quotation. [b] Tuesday prices from *Corn Trade News.* [c] Not available.

This issue has been prepared by Joseph S. Davis, Katharine Snodgrass, and Alonzo E. Taylor, with substantial assistance from E. Gail Benjamin.

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No. 3. *Developments in the Wheat Situation, August to December, 1924.* [Single issue, price $2.00.]

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The Dispensability of a Wheat Surplus in the United States
Canada as Wheat Producer and Exporter
The World Wheat Situation, January to March, 1925

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THE DISPENSABILITY OF A WHEAT SURPLUS IN THE UNITED STATES

I. ELEMENTS OF THE PROBLEM

The extractive stage in American agriculture may be said to have reached its zenith at the close of the last century. Since then each year has been characterized by expanding industrialization and rapid increase in urban population. Agriculture has been passing from exploitation of virgin fields and the open range into mixed farming, diversified agriculture. This transition had led, before the war, to a moderate decline in wheat acreage, more than sufficient to offset some improvement in yields per acre; and with increased population, per capita wheat acreage also declined. Because of reduction in crops and expansion of the home market, therefore, wheat exports before the war were rapidly declining in absolute amount and still more per capita of our population.

Elements of the Problem
Basic Definitions
Nature of Wheat Exports
Desirability as Insurance
Significance for Agriculture
Significance for Business Interests
Conclusions

These tendencies are clearly indicated in Chart 1 (p. 122), which shows harvested acreages from 1900 to 1913, net exports of wheat from 1900–01 to 1913–14, and the same items expressed per head of population. The declining trends in per capita figures are sufficiently indicated by straight lines fitted to the annual data, though there is reason to believe that the tendency would be more accurately expressed by curves descending at a gradually decreasing rate.

Competent agricultural opinion at the outbreak of the European war interpreted these trends as presaging the early disappearance of the wheat export surplus of the United States. A careful appraisal of the circumstances at that time may be held to justify the statement that had the war not occurred, the United States would by 1925 or 1930 have ceased to be a net exporter of wheat except in an "incidental" manner or in exceptionally good crop years. The relative decline in wheat-culture was explained by the fact that wheat-growing, with continued exhaustion of the soil from one-crop farming and with inclusion of marginal acres, was in most parts of the country becoming relatively less remunerative and diversified agriculture relatively more remunerative; and the further fact that while there were areas in which wheat-growing was still expanding, these were balanced by areas in which wheat-growing was being contracted. The state of Minnesota has provided an illustration of these tendencies.

The war caused an abnormal expansion of wheat-growing—both abnormal from the standpoint of historical trends and abnormal with respect to internal agricultural practices, since established crop rotations

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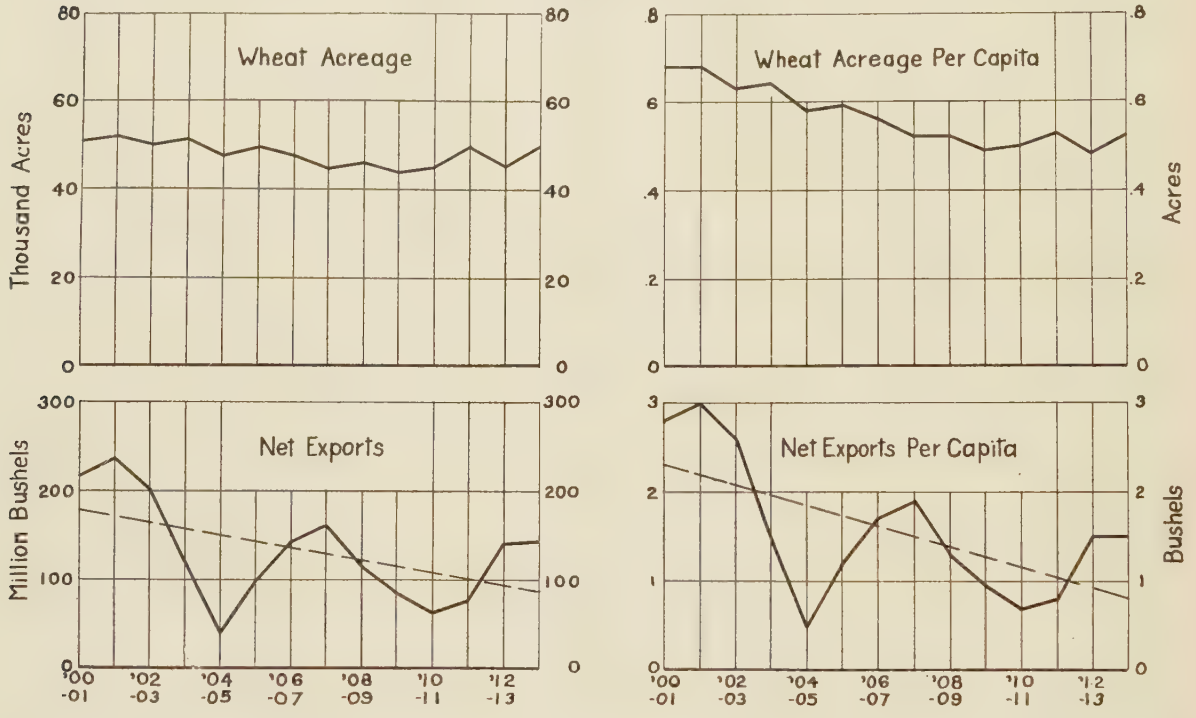
were thereby disrupted. At the same time, the war and post-war periods have intensified the normal expansion of wheat-growing in Argentina, Australia, and Canada.

The results of these expansions of wheat-growing, despite the lapse of wheat export from Russia, during the years 1921–24, are well known. With fairly normal average low world prices, and these were reflected back, in considerable measure, to most American wheat-growers, whether their product was sold at home or abroad.

At this time appeared what may be termed the double-standard theory of marketing, embodied in the McNary-Haugen Bill. According to this theory, the home

Chart 1.—United States Harvested Wheat Acreage and Net Exports, Total and Per Capita, Crop Years, 1900–14



yields, in the face of reduced purchasing-power in Europe, the production of wheat in the exporting countries was so large that, except at low prices, the surpluses could not be effectively absorbed by the importing countries. The result was a buyer's market for wheat in the world during this period. In the United States, despite continuous contraction in wheat acreage each year after 1919, the surplus of wheat during 1921–24 was marketed at a loss to the growers as a whole; and the situation culminated last year in the appeal by the United States Department of Agriculture to have wheat fed to animals in order to get rid of it. America's wheat surplus contributed to a world supply that made for price of wheat in the United States could be released from the depressing influence of the world price by removing the trading operations of the export surplus from the cash and futures markets. It was urged that flour millers, bidding against each other behind a tariff wall, would drive up the price of wheat, presumably to the general price level, provided that all wheat in excess of domestic needs were removed from the home markets. An Export Corporation would effectually fix the American price by offering to purchase wheat at a figure set with relation to the general price level, in effect buying at this price the exportable surplus, while millers competed in purchasing supplies for their mills. The sur-

plus of wheat thus removed from the American cash and futures markets was to be disposed of on the world market for whatever it would bring, and the loss prorated back to the wheat-growers.

According to this double-standard theory of marketing, the gain per bushel on the larger fraction of the crop consumed at home would outweigh the prorated loss per bushel on the smaller proportion of the crop sold abroad at a lower price, far enough to make the net weighted return remunerative to the large majority of wheat-growers in the United States. This was denominated the "equalization of agriculture with industry." Labor, it was urged, has a high-priced home market due to restriction of immigration; manufacturers have a high-priced home market due to the tariff; agriculture would, under the McNary-Haugen Bill, have a high-priced home market through the sale of the domestic and export fractions of a crop on two different price levels. It was recognized, though not emphasized, that the proposal called for improving the status of wheat-growers at the expense of domestic wheat-purchasers.

The proponents of the McNary-Haugen Bill consisted of three groups. Some regarded the situation as an emergency and the measure as justified by the peculiar exigencies of the situation, especially the fixed war-price of wheat, as a relief designed to stave off insolvencies among wheat-growers and keep them on the land until they could retrace their steps, return in part to mixed farming, and restore the more balanced state of agriculture that existed before the war. Others regarded the measure as an undertaking to equalize agriculture with manufacturing during a period of transition, until the growth of population should absorb the exportable surplus and place the country on a domestic basis, the wheat acreage being regarded as fixed during this interval. The third group regarded the surplus of wheat not as an emergency misfortune, nor yet as a feature of an unavoidable but temporary situation, but rather as normal and advantageous, supported by reasons of national policy at home and abroad.

The position of the last group of proponents of the McNary-Haugen Bill is well illustrated by the language of the act and by statements made at Congressional hearings upon it.

Thus the McNary-Haugen Bill adverted to

> the necessity in part for the existence of such surpluses in order to safeguard the domestic market against uncertainties of yield.[1]

And John H. Hagan, Supervisor of Grades, Weights, and Measures of North Dakota, in the hearing on the Norris-Sinclair Bill before the House Committee on Agriculture, January 8, 1924, made the following statement:

> As a matter of fact, we should have 200,000,000 bushels of wheat for surplus in this country. We should have it all along.[2]

On the contrary, the position of the student of agriculture who regards the exportable wheat surplus of the United States as something akin to misfortune, was stated by Senator Capper in his address before the National Wheat Conference, held in Chicago, June 19–20, 1923:

> If America were a wheat importing nation the economic situation of our greatest cereal would be on a different plane, one on which the producer would be far happier than he is today. He would have the better homes and schools and churches to which he is entitled, and his standard of living probably would be on a very satisfactory basis.[3]

If Senator Capper was right, the interests of American wheat farmers are injured by the continuous production of a surplus of wheat. If certain views urged in support of the McNary-Haugen Bill are correct, public interest demands the annual production of a wheat surplus over domestic requirements; and if this must take place at a loss to producers, it is appropriate to adopt measures to compensate wheat farmers for injuries suffered in producing the surplus for the national good.

The three groups of supporters of the McNary-Haugen Bill naturally have differ-

[1] S. 1682, 68th Congress, Part 2, Sec. 21, Sub-Sec. (4).

[2] Hearings, House Com. on Agric. on H. R. 2659, p. 34.

[3] Published proceedings, p. 47.

ent reactions toward the higher price of the present year. Although the average farm price received for the 1924–25 wheat crop by no means approximates the pre-war ratio to the general price level, it is nevertheless regarded as a remunerative price, at least for the hard spring wheat and hard winter wheat belts. The claim for the double-standard scheme of marketing as an emergency measure is, therefore, generally abandoned. Yet those who regard the position of the wheat-grower as in transition until we have reached the domestic basis, believe the measure should be available whenever again the farm price of wheat falls to an unremunerative figure. Those who believe that the maintenance of a surplus of wheat represents a desirable positive policy continue to regard a double-standard marketing provision as necessary, despite the possession this year of a remunerative price with an open world market, since they deem safeguarding the outlook of the farmer imperative.

It is clear that the experience of the present year affords no guarantee of a continuously remunerative price of wheat to the American farmer. He profited this year from an unusual combination of fortuitous circumstances. In a year of generally low crop yields of poor quality wheat, in a year, moreover, of improvement in Europe's purchasing power, he harvested excellent yields of high-quality wheat; because of world conditions his wheat sold at good prices.[1] True, the world's market did not feel the full effects of this stringency until the American farmer had marketed most of his wheat; hence the weighted average farm price per bushel for the year will probably not be much over $1.20, as compared with an average of about 95 cents for 1923–24 and a farm price in January 1925 of $1.62. To be sure, the price outlook for 1925–26 seems at present favorable to growers, and an early recurrence of the unfavorable combination of circumstances that characterized 1921–24 appears quite improbable. Yet with average yields a farm price even higher than this year's average would be unremunerative to many growers. The circumstances this year were exceptionally favorable to the American producer; he cannot count upon an equally favorable combination in subsequent years.

It is, therefore, pertinent to consider whether or not a wheat surplus in this country is desirable or undesirable, dispensable or indispensable from the standpoint of national interest. It is important to determine whether the pre-war trend toward a domestic basis is continuing in the post-war period, and to observe what are the implications of such a change or of measures designed to alter this trend. The meaning and implications of wheat-production on a domestic basis, from the several standpoints of producers, manufacturers, distributors, and consumers, form the subject of the present exposition.

II. BASIC DEFINITIONS

As a preliminary to discussing the dispensability of an export surplus, it is advantageous, indeed essential, to clarify a few fundamental concepts. In particular, we must at once distinguish two very different meanings of the term "wheat surplus." This term may signify either stocks as of a given date or surplus over a crop year. The former is, so to speak, a balance sheet item; the latter, an item in the operating account.

Further, it is necessary clearly to define and to qualify "farm reserves," "administrative stocks," "carryover,"—all balance sheet items; and "exportable surplus" over a year. These are in part statistical items, arrived at in a specified way; in part they include elements not at present susceptible of statistical measurement.

Farm reserves proper consist of wheat held for the purposes of the grower. Many growers carry over seed wheat. Other growers carry over wheat as insurance against crop failure of other cereals. We have no way of measuring these reserves, though they are probably not large for the

[1] See WHEAT STUDIES, No. 3, February 1925.

United States. The Department of Agriculture makes an estimate of "Wheat on Farms" as of July 1, when the reserves are usually at a minimum. This estimate includes, beyond farm reserves proper, wheat that the grower has been unable or unwilling to sell. The wheat on farms on July 1 during the past five years has averaged 41,040,000 bushels, while in the five years before the war it averaged 32,276,000.

The *administrative stocks* of wheat (including flour) belong to elevators, traders, flour mills, and bakeries. In elevators and warehouses and on rails are wheat stocks that are on the way to the mills and to export ports. To maintain continuity of operations and contractual relations, mills keep a certain amount of wheat on hand; they also have a stock of flour in process of aging, and a stock of flour ready for delivery. The milling stocks of raw wheat, of material in process of manufacture, and of finished flour must be maintained in certain positions if the best financial returns are to be achieved, and these positions vary from season to season. We possess for the first time, through the new monthly milling census of the Department of Commerce, a reasonably accurate estimate of the extent of milling stocks on July 1, 1924. Flour stocks are also carried by factors, brokers, wholesalers, and retailers. We have no reliable estimate of bakery stocks, and only imperfect estimates of other flour stocks outside the mills. Large bakeries usually carry several weeks' supply, on hand, in warehouse, and in transit. Small bakeshops buy from week to week.

The administrative stocks vary from time to time. If there is abundance of wheat of all varieties and in good qualities, the administrative stocks may be different in amount and in position from those required if there is a scarcity of wheats of one or all kinds or if the qualities are poor. The existence of separate harvest seasons for hard winter and hard spring wheats is an advantage in position. One way to estimate administrative milling stocks for the large mills is to secure an estimate of outstanding hedges on a particular date. At present it is not possible to do so. Possibly forthcoming data of the Grain Futures Administration may shed some light on this subject, if they enable us to know what proportion of the visible wheat is hedged and how much of the volume of hedged wheat is included in the visible supply. The visible supply (which is contained in the administrative stocks) at present is to a considerable extent related to the export of wheat. If we were reduced to a domestic basis, it seems probable that regular figures for wheat hedged and visible supply might be used both to illustrate the volume of administrative stocks of wheat needed at the different seasons of the year and to indicate the position at a particular moment. If there were no fobbers[1] and exporters, the stocks of wheat and flour necessary for millers, jobbers, wholesalers, and bakers to carry on their daily operations and cover their commitments, would be smaller than they are at present.

All in all, it may be questioned whether, if we were on a domestic basis, as much as 50 million bushels of wheat carried over from the old crop, as of July 1, would be necessary, year in and year out, in order to provide ample administrative stocks for the trade. Such stocks, as ascertained by the United States Grain Corporation, were at the beginning of the years 1917–18, 1918–19, and 1919–20, respectively, 45.9, 18.5, and 43.6 million bushels.

By *exportable surplus* we understand the volume of wheat which could be exported during a particular crop year without disturbing the normal relations of manufacture, transportation, and consumption of wheaten products in the country and without trenching upon necessary farm reserves and administrative stocks, and from which the balance not exported or otherwise disposed of would figure in the carryover into the new crop year. If the world wheat price is low, the exportable surplus will be smaller than if the world price is high.[2]

[1] Merchants who make a practice of selling wheat f. o. b. to exporters.

[2] Variations of exportable surplus with price hold especially for the Balkan States and India. The exportable surplus of Canada, Argentina, and Australia is much more easily determined than the exportable surplus of the United States, because the ratio of crop to population is so much smaller here, and variations in the size of crops affect predominantly the export surplus.

If we have a representative crop of wheat, the exportable surplus can be roughly forecast by subtracting from the reported crop the estimated disappearance for seed, tail wheat, wastage, and domestic milling, with due reference to the characteristics of the crop. Such estimation is made more difficult in the United States by reason of the fact that our current specifications for domestic flour call for wheats of better than our average quality. Variations in wheat qualities therefore materially affect the amount of the exportable surplus, as well as its composition, since varying quantities of low-grade wheat cannot bear the marketing costs and are disposed of on the producing farm.

The term "exportable surplus," thus defined, has a meaning different from "total available surplus" as employed by Broomhall and "total exportable surplus" as employed by Sir James Wilson. These apparently mean the maximum amounts that could be exported with a maximum price attraction.

By *carryover* is understood the net total of farm reserves, administrative stocks, and unexported exportable surplus of wheat in all positions, as of the end of the crop year. Such a figure can be estimated, but there is no satisfactory statistical measure of it. It includes visible supplies, but much more. Like the crop estimate, the figure of carryover is subject to revision and correction, and the revisions are sometimes notably wide. While the carryover includes essential farm reserves and necessary administrative stocks, its commercial importance, especially to growers and to markets, lies not in these two fractions, but in the fraction that represents unsold wheat otherwise available for merchandising.

A certain carryover from one crop year to the next is *prima facie* indispensable. It is necessary to ensure a steady flow of wheat into use during the period of harvest, which may be late or early, and while the marketing of the new crop proceeds under the varying decisions of a large body of farmers. If the carryover is too small, millers may be seriously embarrassed and the cash prices of wheat and flour may rise temporarily. If it is needlessly large, the cash price of wheat and flour is depressed, for a longer or shorter period, and farmers who are compelled promptly to market their wheat lose thereby. A certain minimum carryover is thus indispensable as a merchandising stock; it is merely the size of carryover desirable which is open to discussion.

These definitions and distinctions must be carefully borne in mind in considering the *pros* and *cons* of the indispensability of a wheat surplus as a matter of national policy. The major point in the problem is clearly whether it is in the national interest that American farmers should produce an exportable surplus of wheat.

III. THE NATURE OF AMERICAN WHEAT EXPORTS

Our wheat exports are not a unit. We have two broad classes of wheat exports, one of which may be termed principal, the other incidental. These two kinds of exports have different commodity meanings and somewhat different bearings on wheat prices.

Considering first the exports of wheat as grain, principal exports consist of representative milling wheats[1] raised in excess of domestic milling requirements and sold on the world markets in competition with representative wheats from other countries. Incidental exports consist of particular kinds of wheat which compete less closely with representative wheats either at home or abroad. This incidental wheat filters into the world market without invoking in the same way or to the same extent the reaction of the world price on the home price which attends the export of representative wheats.

These incidental exports of wheat are of several kinds. Durum wheat is used chiefly in the manufacture of alimentary pastes

[1] Under representative wheats are understood the higher grades of standard varieties of milling wheats —hard spring, hard winter, red winter—which have a regular quotation at home and abroad, like Rosafé, Manitoba, and Karachi.

(macaroni, etc.) largely consumed in Mediterranean countries. The competing producing areas are Russia and Northern Africa. Although durum wheat is used to some extent for bread flour, and bread wheats are used to some extent in the manufacture of alimentary paste, for the most part, as to growing, marketing, and utilization, durum wheat stands apart from ordinary wheat quite as much as rye does. In the Pacific Coast states are raised soft white wheats that fit into particular markets. Some Pacific wheat-growing is as purely an export industry as is the growing of malting barley in California. Some high-grade soft white wheats go to the United Kingdom for particular uses apart from the manufacture of bread. Lower-grade white wheats go to the Orient.

Aside from these, substantial quantities of our wheat exports in ordinary years are lower grades of soft red winter wheat, hard spring wheat, and hard winter wheat, after the American mills have made their selections and taken the best of the crop. These too are essentially incidental exports, in the main. If one contrasts the wheats exported from the crops of 1921, 1922, and 1923 with those utilized in the domestic manufacture of flour, one observes the wide contrast in quality, a difference not fully appreciated unless one includes also the high-grade wheats imported for domestic consumption. Wheats, moreover, are mixed for export so as to have the mixture grade No. 2, deliverable on the Liverpool contract market.[1] Such wheat is a principal export. Below this are odd lots, undesirable varieties, and lower grades, sold on sample, or on arbitration, or at a heavy discount below the futures price. Principal exports shade into incidental exports, but the distinction is nevertheless important for its bearing upon prices.

In a particular year, such as the present, the crop may be large enough and good enough to enable us to export considerable representative wheats; but for the most part we export what does not meet our requirements—wheats grading varyingly low from our standpoint, although good enough for the import trade of many countries.[2] Sixty per cent of wheat exported in the fiscal year 1923–24 was of the discount type. In effect, this is a marketing of the culls. This point must not be lost sight of when we compare exporting wheat with exporting structural steel, typewriters, and finished goods. We market finished goods made to specifications of the foreign purchaser; but we do not regularly market rejected products of our factories after the American requirements have been fulfilled.

The export in the manufactured state, flour, stands on a different basis. The buyer in the European flour market finds import flours from the different exporting countries quoted for a series of overlapping grades—fancy patent, top patent, export patent, bakers' patent, straight, first clear, second clear. These flours from the different exporting countries meet each other and also domestic straight-run flours ground from imported wheats and domestic flours ground from blends of imported and home-grown wheats. To some extent, the overseas export flours meet export flours from other countries of Europe. The picture shifts in each season as a result of variations in quantities and qualities in the different importing and exporting countries. These flours are roughly grouped into trade-mark quality flours at the top, clears at the bottom, and what may be termed standard flours between.

Our exports of domestic flour range from patents to clears. Distinctions must be drawn between the three groups of flour exports. (1) There is an established export trade in high-grade flour, often under trade-mark brands, going to all countries of the world, with keeping qualities which fit it to endure the exigencies of transportation and climate. We export the softest white flours for the manufacture of scones in Scotland and the high-grade hard flours for making bread in temperate and tropical countries. These quality flours meet the quality flours of Australia, Canada, and

[1] T. F. Hammatt, U. S. Dept. of Commerce *Trade Information Bulletin* 183, 1924, pp. 12–14, and *Report of the Royal Grain Inquiry Commission,* Dominion of Canada, 1925, pp. 75–107.

[2] There are numerous comparisons to this effect, between American wheats and those of Canada, Australia, and Argentina in the recent report of the Royal Grain Inquiry Commission of Canada.

Hungary in the markets of the world, where, however, the American millers possess advantages in trade experience, technical facilities, and capital resources. The export trade in quality flour represents an advantageous and profitable outlet for both flour mills and wheat-growers. (2) We export a large volume of clear flours for which there is little demand at home. This is a dumping trade. The price of patent flour at home depends upon the prices that can be secured for mill feed at home and for clear flours at home and abroad. The prices of wheat to the American grower and of bread to the domestic consumer both depend to some extent upon the export trade in low-grade flour. These clear flours meet corresponding flours from other countries on a price footing. (3) The third group of flour exports comprises flours that are not of the highest qualities nor yet clears, but represent instead average flours and proceed chiefly from the desire of large mills to maintain capacity operation. These flours are apt to encounter in foreign markets sharper competition than the special flours or the clears.

The prices of these three types of export flours depend in part upon the weighted domestic price of wheat. To some extent, the prices at which they are sold abroad in competition with other flours reflect back to the American mill the world price of wheat. This price reflection is less in the case of the special flours and clears than in the case of other flours. Many other factors, however, in the total accounting of the American milling industry affect the prices at which these flours may be sold abroad. The statement is warranted that the sale of flour abroad has not reflected back the world price of wheat in the same way or to the same extent as the export of representative wheat. In large measure, therefore, our flour exports in ordinary years resemble incidental rather than principal exports.

The volume of export of flour and of incidental export of wheat is surprisingly large, contrasted with the volume of the principal export. Witness the figures for 1923–24: net export of wheat as grain, 51,543,000 bushels, and net export of flour as wheat, 76,907,000 bushels. Six times since 1902 the exports of flour have exceeded the exports of wheat in volume. The crop year 1904–05 gives an excellent illustration of the persistence of export of flour with practical disappearance of export of wheat. Our crop for the year was 597,000,000 bushels. We exported 4,396,000 bushels, imported 3,103,000 bushels and re-exported 571,000 bushels, leaving a net export of wheat of 1,864,000 bushels. The flour export in terms of wheat was 39,720,000 bushels, the flour import 184,000 bushels, the re-export 17,000 bushels, leaving the net flour export equal to 39,553,000 bushels. In that year, while our exports of flour were large, we were net importers of representative wheats.

CHART 2.—UNITED STATES WHEAT PRODUCTION AND EXPORTS OF WHEAT AND FLOUR AS WHEAT, CROP YEARS, 1900–24

(Million bushels)

Chart 2 gives the exports of wheat and flour, respectively, and the crop of wheat for each year during the period 1900–01 to the present. Unfortunately we do not possess even approximate data on wheat ground into flour over the entire period. But the relations indicate broadly, what is evident from a scrutiny of the commodity aspects of the subject, that export of wheat tends to vary with the crop, while export of flour varies rather with the volume of milling. The milling industry does not merely meet a demand. To a considerable extent it seeks one; a certain outturn is the expression of efficient operations, and a market is actively sought for the excess product which results.

In the light of these distinctions it is possible to define being "on an export basis" or a "domestic basis" in terms of the marketing position. From a commodity standpoint, being in the export position may be defined as being engaged in the export of representative wheats. From the standpoint of market procedure, being a wheat export country means parity in wheat prices, both cash and futures, on the American and British grain exchanges, with allowance for shipping and other charges. Under such circumstances, an American exporter can buy wheat on the cash market, hedge the transaction, and be in position to complete the sale to a European importer; the European importer is in position to accept a cash offer from an American merchant for a specified delivery, hedge the transaction in Liverpool, and then effect a cash sale to the British miller. In every normal market, of course, there are days when this cannot be done, when the domestic price rises so far above the Liverpool parity price as temporarily to check export trading. Except in a period of unusually small fluctuations in prices, wheat is bought for export on the breaks of the market when, because of a slight transient rise in Liverpool or a slight transient decline here, the transaction offers an "edge" to the trader. Being an export country in wheat means being on a price parity with Liverpool for both the cash and the futures markets, adjusted for grades and discounts and with established premiums, within the normal range of trading fluctuations. Selling odd lots of wheat, perhaps on arbitration, does not reasonably fall under this category.

Being on a domestic basis means that parity does not exist between cash and futures prices for wheat in our markets and in Liverpool. Under such circumstances, an exporter cannot purchase cash wheat and hedge the transaction with any reasonable hope of finding a European purchaser; European importers would not buy cash wheat in the United States against a hedge in Liverpool when the American price is notably above the Liverpool price. From September 1923 to July 1924 we were on the domestic basis in hard spring wheat. The Minneapolis cash and future prices were so far above the Liverpool prices for the same kind of wheat obtainable from Canada as to check export of hard spring wheat from the United States. During part of the season we were on the export basis for hard winter wheat; and during part of the autumn the cash and future prices for No. 2 red winter wheat made export possible. During the present season we are on the export basis for both hard spring and winter wheats, but have not been on the export basis for good soft red winter or good soft white wheats except at intervals. In times of unusual price fluctuations, an exporting country may be on and off the export basis with almost bewildering oscillation, a phenomenon of which the transactions between Europe and Canada, the United States, and Argentina during this season furnish striking illustrations.

The export of flour and the incidental export of wheat continue after principal export is made impossible by domestic price being above world parity. During the year 1923–24, when we were on a domestic basis in hard spring wheat, export of hard spring wheat flours continued. During the same time durum wheat, grown side by side with Marquis wheat in the Dakotas, was exported in response to the demand for its peculiar qualities. Similarly, we are not on the cattle-export basis, but we export many cattle products; we are a heavy net-importer of wool, yet we have a considerable incidental export of woolen goods.

It would lead us too far afield to determine in detail why American millers can sell abroad flour ground from wheat whose price is too high to permit it to pass into export as principal export. Questions of volume of production, turnover, relation of export fraction to domestic fraction, blendings, established value of trade-mark brands, costs of milling, and other operative factors enter in. We may be sure that incidental export of wheat and regular export of flour would continue even though all of our representative wheats through a season should be above world price parity.

Though it lies outside the scope of the present discussion to undertake a comparison of flour manufacture in the different

exporting countries, or an evaluation of the trade positions of different foreign flours in the importing countries, it is appropriate to make a few observations bearing on the competition between American and Canadian export flours. Including the new Spillers Mill in Calgary, the Canadian flour capacity is about 150,000 barrels for the twenty-four hour day.[1] The outturn of Canadian flour is far below the capacity of the mills and the supply of wheat. Since the war Canadian flour exports have been expanding rapidly, while those of the United States have shown no consistent trend, as shown in the following rounded figures in million barrels taken from official sources:

	1920–21	1921–22	1922–23	1923–24
United States	16.2	15.8	14.9	17.3
Canada	6.9	7.9	11.1	12.0

Canadian flour has been replacing American flour, especially in northwestern Europe. Our flour exports to the United Kingdom have declined heavily, largely, according to the trade, as the expression of higher and more uniform gluten content of Canadian wheat. Most of this wheat is milled in England, but imports of Canadian flour continue to be heavy. The trend is shown in the following rounded figures of British flour imports for calendar years (million barrels) taken from official sources:

	United States	Canada
1921	4.5	3.3
1922	2.6	3.7
1923	2.2	3.1
1924	2.1	3.0

According to the report of the United States Tariff Commission, the average "cost of milling, selling, and administration of hard spring wheat flour" was 7.8 cents per hundred pounds higher in the United States than in Canada; and the average cost of milling, selling, and administration of hard spring wheat feed was 0.3 cents per hundred pounds higher in the United States than in Canada. According to this study, which applied to only one season, the charges for labor and containers were lower in the United States than in Canada, but these were offset by higher expenses for manufacturing, advertising, and selling. On paper, Canadian and American flours have about the same freight rate from mill to Europe; in fact, however, Canadian shipments frequently enjoy a lower rate. The figures given are averages, and the manufacturing and selling costs of some American mills are lower than the Canadian average. American mills compete effectively against Canadian mills in the world market. The difference in costs may be set against either the domestic or the export fraction, but this is done much more easily in the case of American flour than in the case of Canadian flour. The export flour of the United States is less than 20 per cent of the nation's total flour production, while the export flour in Canada is practically 60 per cent of her production. The domestic market is the primary market in the United States, the export market the primary market in Canada. Thus the American miller can shade the export price in a manner that is not possible for the Canadian miller. There is less dumping of clear flours from Canadian mills as compared with that from American mills. Furthermore, American mills enjoy a much wider market for mill feed than is the case in Canada, a feature which indirectly facilitates export of American flour.

Canada enjoys preferential trade relations with various parts of the British Empire, also favorable trade treaties with Italy and Spain, which naturally find expression in increased exports to many countries which have always been good markets for American flour.

The present ability of American mills effectively to compete in the flour markets of the world receives a particular illustration in the fact that our mills are regularly able to import wheat from Canada and export the flour in competition with Canadian flour. Every year a variable amount of Canadian wheat is imported, in transit or under drawback, to be ground and reexported in the state of flour, this volume to join the larger stream of domestic flour going abroad. This represents, in general terms, the manufacturing efficiency and trading ability of our large milling organizations above those of the smaller con-

[1] John J. Conklin, "Canadian Trade Development," *Modern Miller*, Feb. 10, 1925, p. 109.

cerns in Canada. Apparently, Canadian opinion itself holds the view that for the immediate future at least, American flour mills possess distinct advantages over the Canadian mills, since in the report of the Royal Grain Inquiry Commission the proposal is made that an export duty of 42 cents a bushel be placed on wheat entering the United States for grinding for re-export. But Canadians are equally convinced that higher wheat prices in the United States are certain to redound to their advantage.[1]

With this country on the domestic basis, one would expect to see a relatively lower price in Canada for wheat with higher and more uniform gluten content. This advantage American millers would have to overcome through superiority in milling efficiency and merchandising ability. When the Canadian milling industry overtakes that of the United States in the processes in which we are now their superiors, our exports may decline and American milling organizations may be expected to establish mills in Canada. The extent and rapidity of development of these trends are for the future to determine. Our going over to the domestic basis would probably accelerate the trend in favor of export Canadian flour, which is already evident with the country on the export basis. How far this would proceed, cannot now be estimated.

It is, therefore, erroneous to assume, as many do, that if we are to export any wheat and flour the American price of wheat must be closely tied to the world price. We may have a considerable volume of export of flour and of incidental exports of wheat while our prices of representative milling wheats are above the level of world prices. For practical purposes, we may be on a domestic basis for wheat in general while continuing the export of flour and the incidental export of wheat. We must distinguish sharply these two different components of our export surplus if we are to reason correctly about its dispensability or about what to do with it if its disposition becomes a problem. Broadly stated, we may expect to continue the export of the manufactured product, flour, after the export of the raw material, wheat, ceases. We export flour to practically every flour-importing country. The European takings were only 43 per cent of the total in 1923 and but 49 per cent in 1924; whereas, of our wheat, 80 per cent in 1923 and 87 per cent in 1924 went to Europe. In this wide distribution of our flour exports we find added ground for expectation of continuance, and also additional illustration of the difference between wheat export and flour export.

IV. IS A WHEAT SURPLUS DESIRABLE AS AN INSURANCE OF THE NATIONAL FOOD SUPPLY?

The dispensability or indispensability of an exportable surplus of wheat in the United States can be considered with reference to three principal points—its assumed importance as insurance against food shortage; its implied inevitableness in our post-war agriculture; and its significance for various business interests.[2]

The first point suggested is that the production of a wheat surplus is indispensable as a means of guarding against food shortage. The carryover of wheat has a historical foundation—insurance against famine. The early literatures of India, China, Egypt, and Palestine contain references to stores of grain as a provision against lean years, and the idea is deeply embedded in the traditions of most peoples. Consumption being continuous and production seasonal, in an isolated country or in one surrounded by enemies, in a region subject to frequent and severe crop failure, the carryover was not merely a matter of trade convenience—it represented an indispensable social insurance. Siam not long since had a law prohibiting export of rice unless a three-year supply was in hand. India con-

[1] *Report of the Royal Grain Inquiry Commission*, Dominion of Canada, 1925, p. 215.

[2] It might also be argued that the production of an exportable surplus makes for stability in wheat prices in this country; but the argument is involved and by no means convincing. Certainly stability of wheat prices cannot be attained by the production of an exportable surplus.

trols export of wheat until the rainfall of the new season is reasonably assured.

It is recognized that such insurance could be secured by impounding a national wheat reserve against emergencies, in other words constituting a special addition to the carryover; and that this policy is open to all nations, whether or not they produce wheat for export. It would be admitted that a certain element of insurance is regularly provided in the carryover, of importing and exporting nations alike. But, some believe, we can obtain adequate insurance against food shortage, without impounding national reserves, by normally producing a substantial surplus over domestic needs, so that a large carryover can be easily provided when crop shortage is in prospect. It is only in this sense that the production of an exportable surplus could be regarded as indispensable for insuring the food supply.

Historical famines have rarely been due to lack of supplies, but usually to breakdown of transportation or to lack of purchasing power by particular classes. From this fact is derived the principle on which famine relief in India is administered by the British Government. The last famine in China was due to breakdown in transportation and distribution. The available records of famines in India and China convince one that the natural boundaries of these countries in every case contained sufficient food to carry the population through the season if normal purchasing power and distribution had been maintained.

In Russia in 1921 and 1922 there was scarcity of foodstuffs over certain sections of the country, the result of successive short crops. According to Lincoln Hutchinson, of the American Relief Administration,[1] the available bread grains and other foodstuffs of Russia in 1921 were equal to 2415 calories per capita per diem and in 1922 to 2816, contrasted with the pre-war normal of 3106. The population of the famine areas was some 42 million, out of a total population of some 144 million. Within the famine areas, food relief was extended to some 11 million. Some 900,000 tons of food and seed were shipped in over a period of nearly two years. This was less than 3 per cent of the reported cereal crop of the country in 1921. These data indicate that the total food supply within the boundaries of Russia would have been sufficient to cover the minimal needs of the population had transportation, the currency, and political relations between different parts of the country remained intact. It was the economic breakdown of Russia that converted partial crop failure into serious famine. Last year Russia exported some 66 million bushels of bread grain while hunger stalked in some parts of the country. This year, as the result largely of agrarian disorganization, bread-grain imports are being undertaken for seed and food for certain areas, while other areas have a surplus that cannot be made available. But there is little object in comparing countries like Russia, India, and China with the United States.

Considering the world need and yield of wheat, there is a wide gap between the statistical evidence and the fears of journalists and sociologists. After dire prophecies evoked by low crops and high prices in 1897–98, the world production of wheat increased faster than population in the fifteen pre-war years. During the war, when Russia ceased to contribute to the world market and European production had gravely shrunk, there was an astonishing expansion in Canada, the United States, and elsewhere, so that overproduction rather than shortage in relation to the demand was characteristic of 1921–24. The experience of the last twenty-five years indicates that, so far as concerns the next few years or even decades, the world need not worry about having enough wheat to go around. No country need assume the responsibility of producing an exportable surplus, contrary to its economic interest, under the delusion that such a surplus is essential to the well-being of the rest of the world.

Moreover, the likelihood of widespread catastrophic crop failure is so remote as to be removed from practical discussion. The importance of variations in world supply of wheat is always a relative thing. Despite the fact that bread represents from 25 to 50 per cent of the diet in most countries in-

[1] *American Relief Administration Bulletin*, Series 2, July 1923.

volved in the international trade of wheat, the use of wheat is fairly elastic and there are many substitutes, in both importing and exporting countries. With varying crop yields, these substitutes act as buffers or shock-absorbers. This state of affairs, in the event of continued mobility of intercontinental transportation and international finance, deprives the world surplus of wheat of really noteworthy sociological importance, although its importance for the wheat trade persists.

We have had central market wheat prices in this country for over eighty years. When one scrutinizes the course of wheat prices and wheat crops during this time one becomes convinced of the rarity of a crop failure sufficient to cause serious rise in price. The prominent cause of marked rises in the price of wheat during this time has not been crop failures, but war. The notable exceptions are the year 1898–99 and, most particularly, the present crop year. We have no modern records of crop failure in the United States which placed the population of human beings or domestic animals in jeopardy. When we consider the four large wheat-growing sections of the country in the light of both weather and yield, we realize how distant is the possibility of food hazard from failure of the wheat crop. We have had failures of coarse grain crops, but never sufficient to cause more than a small slaughtering of animals on account of the scarcity of feed, after adaptations and substitutions of other feeds had been made use of. We have so many different areas and climates, and the agricultural capacities are so greatly in excess of the current needs of the population, that wheat crop failure in any direction, serious enough to represent material hardship through inability to effect adaptations and substitutions, would seem to be almost an absolute impossibility.

The modern system of finance, the carrying on of business largely on the basis of credit, the possession of a federal reserve system whereby the credit burdens of any one section are shared by all sections—these important improvements in our economic organization make the distribution of agricultural produce easy and certain in time and in space. A zonal shortage of buying power, sufficient to endanger food supplies in certain sections, seems practically impossible in the United States. Finally, our transportation facilities have been so perfected that breakdown of transportation can hardly threaten serious shortage of supplies. It is in the perfection of financial organization and transport facilities, national and international, that the United States is so greatly superior to China, to India, and to Russia.

If the United States were an agglomeration of individual states with political frontiers, the hazard of crop failure in each state would be considerable. For this reason, the hazard of crop failure in Europe is both different and greater than in the United States. Even there, with modern facilities of transportation and finance, the hazard does not warrant any country in producing a large reserve as insurance of its food supply.

It does not seem reasonable to urge military considerations in support of a large carryover of wheat. A part of the Canadian crop naturally passes into export through the United States. The crops of the Prairie Provinces of Canada would always be available to us in case of need. The idea that we need to raise more wheat than normal circumstances require as a provision for national safety, is so far-fetched as to seem out of the range of possibility.

Looking beyond our national boundaries, a world shortage due to widespread wheat failure would affect first and foremost the countries with low purchasing power, and would bring the buffer effect of substitution crops forcibly into operation. The wheat-producing areas of the world are so numerous and so varied and the possession of substitutes is so general, that catastrophic failure of the world crops on account of unfavorable weather or ravages of pests is a very remote possibility. Adaptations and substitutions would be made, if called for, all along the line, in accordance with resources, but the poorest countries would perforce practice the most extensive adaptations and substitutions. The creditor countries with largest buying powers would have the first call on available supplies for

their import needs; the poorer countries would not be in position to compete effectively. For a rich country like the United States regularly to have a surplus of wheat as a protection against the poor countries of the world, would seem absurd, a precaution out of all proportion to the emergency it might be designed to meet. In particular is this true when a large surplus is regularly produced by our next-door neighbor.

V. IS A WHEAT SURPLUS AGRICULTURALLY UNAVOIDABLE?

Broadly considered, we have four classes of wheat farmers, grouped according to the place of wheat in the farm operations. Naturally, the groups overlap.

In the first group, wheat is one of the small grains planted in a definite scheme of crop rotation. In many sections wheat is found to be better suited to the scheme of rotation than the other small grains (oats, barley, and rye); it is sometimes valued for spring pasture and for the straw almost as much as for the cash value of the harvested crop. Being part of an established scheme of crop rotation and associated with animal husbandry, the acreage of wheat among this group tends to be relatively independent of all except extraordinary price fluctuations.

The second group of farmers plant wheat for a minor cash crop, in accordance with experience in their localities and with little reference to the other uses to which their lands are put. The acreage recommended in the country-wide county wheat surveys of 1917–18 and 1918–19 included a considerable acreage of this kind, which tends to enlarge with rising price and to contract with falling price.

In the third group wheat is a major cash crop, often alternating with other cereals as major crop in a regular scheme of rotation. Sometimes, in rotation with corn, wheat alternates with oats. This acreage responds readily to change in price, particularly if the change affects wheat more than the coarse grains.

For a fourth group of farmers, chiefly in the subhumid and semiarid areas, wheat is the principal crop, possibly the only cash crop. In some sections cereal rotation is hazardous, wheat is the safest crop, diversification is difficult because soil and rainfall are poorly adapted to demonstrated practices with fodder crops, good animals are hard to secure, and land once broken is difficult to return to natural pasture or to cover with planted grasses.

Wheat production by all these groups expanded in the wheat boom of 1915–19. Unfortunately, we do not possess data enabling one to classify the war and post-war expansions state by state, according to type.

Now, is a regular surplus of wheat the combined expression of irreversible one-crop cultivation in some areas and of advantageous crop rotation in other areas, and is it consequently unavoidable?

Undoubtedly there was a time, in the course of the natural development of our agriculture, when natural expansion in wheat-growing exceeded growth of population, and a wheat surplus was agriculturally unavoidable. This is the present situation in Canada, Argentina, and Australia. There is for countries capable of large wheat production an early state of development when a wheat surplus is unavoidable; also a stage when it lies within the adaptation of agriculture to import or to export wheat; and also, in many countries at least, a stage when wheat import is practically unavoidable—each stage representing in turn the developing relations of population on the one hand to land area on the other.

A reasonable technical interpretation of our present situation is that a wheat surplus in the United States is no longer unavoidable; it now lies within the range of normal agricultural adaptation to continue on a wheat export basis or to retreat to a domestic basis, so far as principal exports are concerned. Had the world experienced no great war and had the trends of expansion of wheat-growing in the different parts of the world developed in accordance with their demonstrated potentialities, we should probably have already ceased to contribute to the world market any considerable quan-

tity of representative wheats, as the result of the natural growth of population and the development of our diversified agriculture.

It is sometimes urged that a large part of the war and post-war increase in wheat acreage is irreversible, that once the new land had been plowed for wheat it could be used for nothing else in the present condition of agriculture, since no feasible method of returning that land to grass is known. The new war and post-war wheat acreage was obtained from meadow and pasture land, from ground in use for other harvested crops, and from new subhumid and semiarid land. The largest fraction came from pasture. It is true that certain new lands in the Rocky Mountain States, in the present stage of agricultural technique and with prevailing prices of agricultural products, can be devoted to no other crop than wheat. But these lands, mostly lands of low yield per acre, have not contributed largely to the dilemma of the exportable surplus, and they do not dominate the situation. The difficulties presented by these lands once fully conceded, the fact remains that the war and post-war wheat expansion was largely in areas of diversified agriculture, where practices of crop rotation had been worked out, where alternative crops could be produced. Kansas presents excellent illustrations of this situation.[1] Indeed, in many places established schemes of crop rotation were disrupted and the expansion of wheat acreage represented an injury to established agriculture. The harvested acreage of 1924 was 28 per cent less than in 1919; the per capita wheat acreage harvested in 1924 was slightly below that of the average of the five years before the war. A large part of the readjustment has been completed.

If one scrutinizes the acreage according to states, the preponderating responsibility of areas of diversified agriculture for expansion in the wheat acreage becomes clear. Appendix Table I shows the expansion in wheat acreage by states, comparing the average acreage planted for the crops of 1912, 1913, and 1914 with the corresponding average for 1918, 1919, and 1920, and the subsequent readjustment in wheat acreage, using the average for the crops of 1923 and 1924.

Most of the wheat expansion that might be held to be irreversible occurred in Montana, Idaho, Wyoming, Colorado, Oklahoma, and Texas, though the new wheat acreage in these states was by no means wholly of this type.[2]

Table 1 compares the planted acreage in this group of states with that of all other states, for a pre-war period, the peak period, and the last two years. For this special group of states, the average planted acreage for the crops of 1912–13–14 was 5,165,000; the average for 1918–19–20 was 11,111,000, an increase of 5,946,000. The average planted acreage of the rest of the country in the first period was 47,759,000 and in the latter period 57,526,000, an increase of

TABLE 1.—ADJUSTMENT AND READJUSTMENT OF WHEAT ACREAGE SINCE 1912, IN SPECIAL GROUP OF STATES COMPARED WITH OTHERS*

(Thousand acres of planted area)

Crop of	Special group *a*	All other states	Total
1912	4,392	48,080	52,472
1913	4,753	46,766	51,519
1914	6,351	48,430	54,781
1918	9,517	56,015	65,532
1919	12,256	62,133	74,389
1920	11,559	54,429	65,988
1923	12,046	54,195	66,241
1924	10,655	47,307	57,962
Averages			
1912–14	5,165	47,759	52,924
1918–20	11,111	57,526	68,637
1923–24	11,351	50,751	62,102
Net change			
1912–14 to 1918–20	+5,946	+9,767	+15,713
1918–20 to 1923–24	+ 240	–6,775	– 6,535
1912–14 to 1923–24	+6,186	+2,992	+ 9,178

* Source: *Agriculture Yearbook 1923.*
a Montana, Idaho, Wyoming, Colorado, Oklahoma, Texas.

[1] According to Professor W. E. Grimes, eastern and central Kansas increased their wheat acreage between 1913–15 and 1921–23 some 1,580,000 acres; western Kansas only 1,380,000 acres. Paper read before the Farm Economic Association, Chicago, December 31, 1924.

[2] The small areas of the same kind of land in Nebraska, western Kansas, and the Dakotas may be regarded as offset by wheat land in the first group of states known to be amenable to diversified agriculture.

9,767,000 acres. Thus the expansion in this special group of states, while relatively large, was only about 38 per cent of the total expansion. If wheat acreage had expanded in the special group but not in the rest of the country, the average acreage for 1918–19–20 would have been 58,870,000 acres instead of 68,637,000. The war expansion in the special group resulted in an increase of the crop (average of the three years) of 52 million bushels over the average of the three pre-war years; the increase elsewhere accounted for 60 million bushels. The wheat surplus of the peak period cannot, therefore, be ascribed predominatingly to the yields on the one-crop subhumid and semiarid lands of the Rocky Mountain States. If the states south and east of Minnesota and the Dakotas face the question of wheat acreage as those states have done, the problem of the Rocky Mountain States will cause no concern.

Table 1 also indicates the measure of readjustment that has taken place. Taking average figures, it appears that the decline in acreage has been confined to the states outside this special group. These other states show a reduction in planted acreage from 1918–19–20 to 1923–24 of 6,775,000 acres, and a net increase since 1912–13–14 of only 2,992,000 acres. In the special group of states, however, there has been no reduction in wheat acreage.

So far as the place of wheat in our diversified agriculture is concerned, there is nothing in the scientific literature of agriculture to convince one that the pre-war wheat acreage was too low and that the post-war wheat acreage has been a more correct expression of the proper place of wheat in the scheme of rotation. Quite the contrary, the post-war wheat expansion was a reaction in response to price and war appeal and led to departures from correct diversification. It is true that the decline in horses and the extension of automotive traction make oats a less desirable crop than was the case before the war. The prohibition of alcoholic beverages has reduced the demand for barley. Must wheat take the place of these? By no means. American farmers do not yet adequately appreciate the use of oats, barley, and rye in the feeding of animals, a use well understood abroad, and repeatedly demonstrated in agricultural experiment stations in different parts of this country. In the case of Nebraska and Kansas moreover, the post-war expansion in wheat acreage was, in considerable part, directly at the expense of corn, legumes, and animal husbandry.

In summary, if one were to go over the situation state by state and catalogue the wheat acreages in accordance with reasonable definitions of diversified agriculture, as demonstrated in practice on the one hand, and of irreversible one-crop cultivation on the other hand, one would secure a figure for acreage whose yield in average years would not furnish an exportable surplus of contract grade milling wheats.

It is clear, on the contrary, that for the immediate future at least, the production of some exportable surplus of durum wheat, soft white wheat, and cull wheats, may be agriculturally well-nigh unavoidable. In the Dakotas, farmers can turn from durum to Marquis wheat by adopting summer fallow and using clean selected seed. Only in Idaho, the triangle of Montana, eastern Washington, and eastern Oregon is there a serious problem with wheat. Should export become particularly unprofitable, agricultural adaptations to reduce the surplus can be confidently expected. But these incidental exports do not, in large measure, create the problem of the exportable surplus which we are investigating.

If one tries to imagine what the present wheat acreage of the United States would have been if the United States and Canada had been one country, he comes surely to the conviction that the area of the United States would not now be producing an exportable surplus of wheat. Indeed it is quite within the bounds of possibility that shipments from the Canadian area would more than offset, in an average year, the volume of incidental exports from the area of the present United States.

Because of inevitable fluctuations in crops from year to year, a country cannot expect to be on an accurately adjusted domestic basis. In years of shorter crops we would import from Canada. In years of larger crops, some wheat might be ex-

ported, but a more probable disposal would be feeding to animals. Wherever wheat is grown, a recently discovered method for converting straw into compost and the wider industrial utilization of straw hold promise of by-product return per acre. In all that has here been said, consumption has been regarded as constant. It is not to be expected that wheat consumption will expand and contract notably with domestic supplies in this country. There are few reasons for anticipating an increased ingestion of wheat in the near future. Farmers are in position to take up the slack by using the lower grade wheat as feeding stuff. This represents the natural course with the country on the domestic basis. Thus, on a domestic basis, in lean years wheat would be imported from Canada; in long years more of our low-grade wheat would go to feed domestic animals.

VI. IS A WHEAT SURPLUS INDISPENSABLE TO BUSINESS INTERESTS CONCERNED WITH WHEAT?

It is desirable and necessary to consider the position of business interests involved in the customary wheat surplus. If wheat-growing should become contracted to the domestic basis, the lapse of wheat export will have a direct effect on numerous classes which contribute services in connection with the export of wheat. Indeed the marked reduction in wheat exports from 1920 to 1924 had such an effect.

Accepting the view that the wheat crops of 1921, 1922, and 1923 were sold at a loss to the producing class, one who views the export of wheat as grain during those years in the light of the multitudinous business transactions involved, sees clearly that wheat growers during that period were largely engaged in raising business transactions for others, instead of raising a product at a profit to themselves. It is advantageous briefly to review the transactions involved in the marketing of wheat and to appraise the consequences implied in a contraction of wheat-growing to the domestic basis.

The distribution of wheat and wheaten products includes the services of grain buyers, elevators, commission houses, warehouses, grain exchanges, railways, waterways, telephone and telegraph companies, banks, and insurance companies. The toll for these services varies largely with the volume of business. The larger the crops to be handled, the more the opportunity in the business. Hence a decline in the volume of business involves reduction in profits and readjustment in capital accounts.

The grain elevator system is overextended. We have some 20,000 elevators in the country, many of them inefficient and obsolete. There has been uneconomic duplication of elevators, often by farmers themselves. The development of railways and the growth of the freight rate structure have also contributed to the excess of elevators. Growth of population, regional changes in agriculture, and shifting of milling centers have contributed also. Grain-growing, even on an export basis, cannot long carry the overload of the present elevator equipment; a reduction in the inventory is inevitable.

Port and terminal elevators also, unless adaptable to other uses, face a declining business, involving large investments at Chicago, Buffalo, North Atlantic ports, New Orleans, Galveston, and Pacific ports. The North Atlantic ports are also used for the export of Canadian wheat. With the anticipated development of Canadian wheat export, these ports would expect to share in the business unless the Canadian ports are placed in position to handle all the outward flow of wheat.

There can be no doubt that exchange trading in wheat futures would be greatly reduced if the country were on a domestic basis. When the world statistical position is such that exportable surpluses in producing countries and importers' requirements in consuming countries are equated without notable divergence from the pre-existing price level, speculative interest is at a minimum. When, as this year, the equating

of supply and demand is possible only with a notable shift in the price level, speculative interest becomes intense. So long as we are on an export basis, wheat prices here are sensitive to even minor developments all over the world. If, however, the United States were on the domestic basis behind a tariff wall, speculative interest in domestic wheat would become intense only when the equating of domestic demand and domestic supply involved a notable shift in the price. The withdrawal of speculation and hedging now related to the export of wheat, would greatly reduce the volume of exchange trading, and therefore the business and profits of all interests connected with such trading.

The effectiveness of hedging depends on the breadth of the speculative market. When there is little speculation, hedging becomes less effective and yields only precarious insurance. If there were nothing but hedging operations, no speculative trading on the wheat exchanges, hedging would lose most of its value. This has been the case at times and on certain markets during the years 1921–24, the condition being aggravated by high premiums for particular wheats. When the insurance value of hedging is diminished, manufacturing and distributive margins must be increased in order to cover the risk. One must, therefore, envisage the possibility that contraction of wheat-growing to the domestic basis may, for this reason alone, involve indirectly increased charges by miller and merchant, charges to be paid for by the producer or the consumer or both.

With heavy carryovers and export surpluses, flour millers find it easy in normal years to secure the wheats desired in their operations. The practices of sampling, buying, selling, and blending are facilitated, and the costs of operation reduced. The fact that northern millers buy more or less Canadian wheat duty-paid indicates how highly they value their formulas and blends. How important these factors are in the conduct of milling cannot be determined until the mills have made the experiment of running on the domestic basis. Much would depend on where the reduction in acreage occurs and on the character of the crops. If the acreage reduction were to fall largely on the hard wheats, the operations of the mills would be more seriously disturbed than if the acreage reduction fell largely on the soft wheats. In a year of normal yield of good qualities, the mills might experience no embarrassment; with a yield of poor qualities, millers might be forced to import wheat plus the duty, at a relatively high price, in order to avoid the degradation of trade-mark products. Milling on a domestic basis would probably introduce a relationship between patent flour, straight flour, clear flour, and mill feed different from that which obtains in the presence of a wheat surplus. Other things being equal, if the high wheat tariff is maintained, the spread of premiums on choice wheats would tend to be widened and the cost of manufacture of flour somewhat increased. The volume of flour milled would not necessarily be reduced with the country on the domestic wheat basis, since large exports of flour might and probably would continue. The distribution of milling in the different regions of the United States, however, might undergo appreciable alteration, probably with eliminations of mills in some regions.

The flour milling of the country is overextended, the merchant mills being able to grind more than double the present requirements for domestic need and for export. It is true that this overextension of flour milling has a definite historical explanation in the shifting of population and of wheat-growing, influenced by railway development, the growth of the rate structure, and changes as to power employed in milling. And there has also been senseless competitive duplication. Flour milling is a business in which excessive competition does not make for economy. Hence, flour milling under any circumstances faces a revamping, with writing-off of obsolete and redundant mills; and the reorganization of the industry into one more compact and efficient would be accelerated by the change of wheat-growing from an export to a domestic basis.

The significance to railways of the carriage of wheat is well illustrated in the operations of the granger roads in years of

varying wheat crops and of seaboard roads in years of varying exports. It takes many thousand cars hauled many thousand miles to carry 100 to 200 million bushels of wheat from the Central States to seaboard, and unquestionably the business has represented a notable addition to the volume of traffic, even though on a strict accounting basis the rate per bushel might not be regarded as especially remunerative.

In the handling of the export wheat from the farm to the seaboard, credit and insurance also are required, and furnishing these facilities constitutes a source of revenue to banks and insurance companies. The effect of the withdrawal of this business would be felt not only in the wheat-growing areas but also in the money centers, since the credit provisions for crop movements constitute notable transactions for the metropolitan banks.

Adaptations on the part of bakeries and housewives will also be necessary when the country is reduced to a domestic wheat basis. We have in the country five outstanding types of flour, though these overlap and the approximate quantities of each are not known. There is, first, short-patent, strong flour. The second is short-patent, soft flour. Then there is patent flour for the bakery trade, of only moderately short extraction. Fourthly, we have a group of mixed flours that go into the making of self-rising flours. Lastly, there is general-purpose flour, designed to cover the needs of small bakeries and households. In a year of wheat surplus with good qualities in the various kinds of wheat, the makers of these flours enjoy considerable freedom in securing their wheat supplies. In a year of wheat surplus with poor qualities, the facilities of millers are more or less curtailed and the relative prices of certain flours rise.

If, now, the country were to go on the domestic wheat basis, it would become difficult in a year of average yields for these various kinds of flours to be manufactured in the customary manner. Higher extraction might become necessary in the manufacture of flour for bakers. The makers of the strongest bread flours and of the softest cake flours would always be able to produce a certain volume of the premier products. The makers of general-purpose flours might have to modify their blends from year to year. The better the crop in quality, the less the unavoidable adaptations; the poorer the crop in quality, and particularly in the direction of hard wheats, the more onerous the necessary adaptations.

Up to the present the baker and the housewife have practically insisted on flours that enabled them to continue their customary practices without change. The miller has had to meet the baker, and this the miller was able to do largely because of the presence of a wheat surplus in the country. With the country on the domestic basis, the situation would probably be reversed. The miller would do the best that he could with the crop, and bakers and housewives would probably have to modify their practices from time to time to meet the varying characteristics of the flour which would result.

For the baker the problem is largely technical. The present practices of American bakeries place heavy emphasis on strong flour. This is due in part to mechanical and other operative factors determining the maximum outturn of loaves of bread per barrel of flour. It is due in part to the failure of bakeries to take advantage of modern advances in physical chemistry. When the country goes on the domestic basis, bakers will be compelled to choose between higher-cost flour made from duty-paid wheat and modifying their practices to adapt them to softer flours. There is fact as well as theory in this matter. Experimental bakings conducted in this country with semi-hard flours, using advanced physico-chemical methods, have demonstrated on a large scale that satisfactory breads can be made from flours containing two or three per cent less protein than is at present currently demanded by bakers. This enlargement of the range of adaptation of baking practices will represent an advance that is in the interest of both producer and consumer. Advanced thinkers in the domain of bread-baking, both financial and technical, are fully aware of the inevitable developments. It is fair to conclude that when the country reaches the domestic basis, bakeries will adapt their

practices to the varying characteristics of flour that may be imposed on the miller by the changing character of his wheat supplies, and this to the entire satisfaction of the consumer.

In short, it is clear that the reduction or elimination of the wheat surplus involves loss of business and capital to interests that are concerned with wheat export, and downward readjustment in investments and organizations now sharing, directly or indirectly, in the export business. The establishment of a domestic basis would increase the problems of millers, perhaps also their costs. It would probably involve more or less extensive adaptations on the part of millers, bakers, and housewives.

These disadvantages must be squarely faced. They do not indicate, however, that the wheat surplus is indispensable. Such readjustments as these are constantly in process in the business world, and take place gradually with far greater ease than might be expected. To a certain extent they have already taken place in connection with wheat. Certainly it cannot be argued that the export surplus should be maintained at an appreciable cost to growers, consumers, or taxpayers, and at the expense of our natural resources, simply in order to avert these consequences to business interests.

VII. CONCLUSIONS

The conclusions from the foregoing discussion may now be summarized:

(1) America's exportable surplus of wheat consists of three components: "principal exports" of representative milling wheats; "incidental exports" of special classes of wheat and of cull wheats of milling types; and high-grade, standard, and low-grade flours that are largely specialties or essentially by-products.

(2) Incidental exports of wheat and exports of flour may be expected to continue to some extent indefinitely, but they have only an indirect bearing upon the wheat price problem created by the surplus of representative wheats.

(3) The war interrupted the declining trend of principal exports, which might already have brought us to a domestic basis so far as representative milling wheats are concerned. The substantial readjustment in acreage since 1919, together with the increase of population, tends in the direction of bringing us to a domestic basis in this important sense, except in a year of unusual yields like the present.

(4) Unless artificial stimulus to wheat planting is provided, these same forces promise to continue progressively, for most areas without anything like as great readjustment as has occurred since 1919, to bring the United States to a domestic basis in representative wheats. America's export surplus of these wheats, far from being agriculturally unavoidable, will disappear as agriculture regains normal equilibrium.

(5) The maintenance of an export surplus of wheat cannot properly be urged on the ground of insurance against famine or even serious food shortage. Such danger is so remote as to be negligible, even with world shortage, considering the food resources of the country, the possibilities of substitution, the transport and credit facilities, and the strong economic position of the country.

(6) The production of an exportable surplus is not essential to the maintenance of adequate administrative stocks. These are maintained by importing countries and self-sufficing countries no less than by exporting countries. A certain amount of wheat will be carried over from year to year regardless of whether we are on an export basis or a domestic basis.

(7) The elimination of the exportable surplus of representative wheats, by reduction in acreage and crops, would reduce the volume of business for railways, elevators, dealers, bankers, and exporters, and the volume of exchange operations. It would thereby reduce the profits of various business interests and cause a certain amount of loss to them. It would call for adaptations and reorganizations by millers and bakers. Such a process, more or less

offset by developments in other lines, is involved in any substantial current readjustment of business operations. It is difficult to argue that the exportable surplus should be maintained, and the natural readjustment of agriculture prevented, in order to provide business for these interests or to minimize their readjustments.

In short, an export surplus of wheat is by no means indispensable to the United States.

If these conclusions are sound, it follows that the advocates of a positive policy of maintaining a surplus of wheat for export have a heavy burden of proof. Such a policy involves a cost of indeterminate extent. If production for export is profitable, it will continue naturally without government intervention or support. If it is unprofitable, the loss entailed must be borne in some manner by the grower, the wheat purchaser, or the taxpayer, or be distributed among them. The McNary-Haugen Bill called for a nominal prorating of losses back to the growers but a real shift of the bulk of the burden to the wheat consumers. Indeed, the bill would have lacked the support of agricultural interests if it had not involved some such shift of the ultimate loss. Such a shift is far greater than is implied in the slogan, "equalize agriculture with industry." No tariff policy has yet been formulated that will protect agricultural or industrial enterprises from the readjustments necessary after a period of overexpansion, or from losses incidental to such readjustments. Conceivably there may be reasons for urging this extraordinary policy in the case of the wheat farmer, even though his peculiar emergency has passed; but they do not lie in the indispensability of the wheat surplus.

APPENDIX

TABLE I.—ACREAGE PLANTED TO WHEAT BY STATES AND GROUPS OF STATES FOR PRE-WAR PERIOD, PERIOD OF PEAK ACREAGE, AND RECENT PERIOD*

(Thousand acres)

States	Crops of 1912–14 average	Crops of 1918–20 average	Crops of 1923–24 average
A. Soft winter			
Maine	3	16	5
Vermont	1	14	4
New York	355	474	405
New Jersey	83	87	75
Maryland	620	687	528
Pennsylvania	1,322	1,472	1,283
Delaware	116	131	106
Virginia	783	994	816
West Virginia	242	306	226
North Carolina	622	775	539
South Carolina	82	149	174
Georgia	142	199	189
Ohio	2,081	2,683	2,594
Kentucky	777	822	611
Tennessee	724	648	412
Mississippi	4	27	4
Alabama	33	74	20
Indiana	2,367	2,526	2,065
Illinois	2,460	3,583	3,339
Michigan	907	1,020	971
Wisconsin	192	452	114
Iowa	783	1,166	681
Missouri	2,470	3,654	2,600
Arkansas	111	217	68
B. Hard spring			
Minnesota	4,176	3,579	1,754
North Dakota	7,595	8,152	9,168
South Dakota	3,610	3,492	2,602
Wyoming	91	235	159
Montana	887	2,449	3,439
C. Hard winter			
Nebraska	3,600	4,147	3,707
Kansas	7,842	10,809	10,806
Oklahoma	2,080	3,957	3,500
Texas	920	1,968	1,466
Colorado	479	1,440	1,779
New Mexico	71	219	165
D. Pacific			
Utah	277	301	266
Idaho	535	1,061	1,008
Nevada	42	30	20
Washington	2,176	2,588	2,511
Oregon	815	1,108	1,132
California	417	884	752
Arizona	30	41	39
GROUP TOTALS			
A. Soft winter	17,280	22,177	17,830
B. Hard spring	16,360	17,907	17,122
C. Hard winter	14,992	22,540	21,422
D. Pacific	4,292	6,012	5,728
GRAND TOTAL	52,924	68,636	62,102

* Source: U. S. Department of Agriculture data, chiefly from *Yearbook 1923*, subject to minor revisions now in process. The headings are only approximately correct, for there is more or less overlapping of areas.

This issue is the work chiefly of Alonzo E. Taylor, with assistance from Joseph S. Davis and Katharine Snodgrass.

The data employed are the latest available on March 7, 1925.

WHEAT STUDIES

OF THE

FOOD RESEARCH INSTITUTE

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WHEAT STUDIES

OF THE

FOOD RESEARCH INSTITUTE

VOL. I, NO. 5 STANFORD UNIVERSITY, CALIFORNIA APRIL 1925

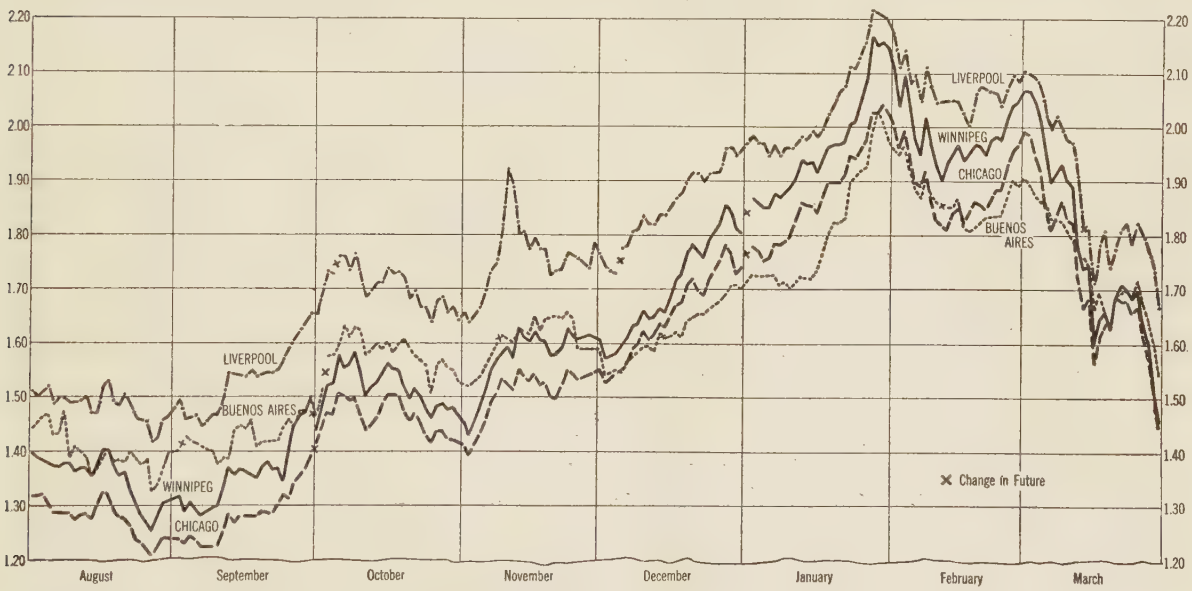
DEVELOPMENTS IN THE WHEAT SITUATION JANUARY TO MARCH, 1925

I. CRISIS IN WHEAT PRICES

The three months under review have witnessed a major crisis in wheat prices. After an advance of unprecedented rapidity during the preceding eight months, the movement culminated late in January at over $2.00 a bushel at Chicago. This was practically double the price of last May. Except in war times, the rise was almost without parallel in the history of the commodity. Having been reached, however, the $2.00 level was maintained less than a week before prices began a sharp decline. After a partial recovery in February, a veritable collapse occurred, in the course of which prices dropped by more than 50 cents from the high point, a decline comparable in degree with that in 1920. Selling pressure, during March especially, was of unexampled severity. These aspects of the price movement appear clearly on Chart 1. Early April witnessed further decline in prices. Since then there has been some recovery. During re-

CHART 1.—FUTURE PRICES OF WHEAT IN PRINCIPAL MARKETS, DAILY, AUGUST 1924 TO MARCH 1925*

(Dollars per bushel)



* Sources: Winnipeg and Chicago prices from Chicago *Journal of Commerce;* Buenos Aires and Liverpool prices from New York *Journal of Commerce.* Quotations for nearest future.

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cent weeks May wheat has fluctuated around $1.50 a bushel at Chicago.

The chart, showing the daily quotations for the nearest future delivery month at Chicago, Winnipeg, Buenos Aires, and Liverpool, portrays the movement in the leading world markets not only from December to March but for the four preceding months as well. Cash prices have run roughly parallel to the futures, when allowance is made for premiums and discounts.

Prior to August, prices had been advancing only since June.[1] During the two preceding years they had been relatively low and relatively steady.[2] In June 1924, however, under the influence of prospective and actual crop shortage, there was a reversal of conditions, and prices began to advance sharply in all markets. This advance continued with only moderate interruptions until the break in February 1925.

It may never be possible to explain fully the course of prices in recent months; certainly no adequate explanation can be made at this time. The following suggestions toward an explanation, therefore, are confessedly tentative.

Price Basis Uncertain

It is clear that since last November there have been no changes in the statistical position, or in the evidence concerning the fundamental facts of supply and demand for the crop year, sufficient to account for either the rise or the decline in prices. The simple fact is, as stated in our previous survey, the situation was so unprecedented that there existed no sound basis upon which to estimate the normal level of wheat prices for the season. In our previous analysis we laid emphasis upon the underlying factors, and these are given further attention in later sections of this issue. It must be remembered, however, that prices are strongly influenced not only by actualities but also by appraisals of future probabilities made and acted upon by traders in the market. Hence a consideration of the psychological factors at work, and in particular of the influence of speculation, is needed for an understanding of market movements in the recent period.

The situation during this crop year has been unique in many ways. The bumper crop of 1923 was succeeded in 1924 by a short crop of poor average quality and abnormal geographical distribution. Furthermore, the extent of the buying power of war-stricken Europe remained undefined and the restorative power of the Dawes Agreement was impossible to evaluate. The diet of Europe, seriously disrupted during the war, had not yet returned to normal. Lack of free international movement of gold and the presence of fluctuating currencies at abnormal valuations have been further complicating factors. Under these circumstances, despite general agreement on the gross quantitative statistical position, faced with a complex situation whose numerous individual factors were not susceptible of direct market analysis, traders have been of widely divergent opinions with regard to the price outlook and have registered these divergent views in their market activities.

Advance from June to January

Even as early as June 1924, certain traders, realizing that the value of wheat was abnormally low with respect to the general price level, accepted the first indications of small winter-wheat crops in the United States and in Europe at their then face value and made extensive purchases of cash wheat and rye and of wheat and rye futures. As the season progressed, expectations of world crop shortage were confirmed, improvement in the United States being offset by deterioration elsewhere. But the heavy marketing of the American crop served to moderate the advance in prices until September 1924. At that time, however, European buying assumed extraordinary proportions because of the domestic crop situation, and prices advanced sharply until current requirements were more than filled. Then a moderate decline in prices set in.

This decline was short-lived. Following a spurt in speculation immediately after the American election, the market began about the middle of November to show steadily

[1] See chart in WHEAT STUDIES, February 1925, p. 105.
[2] *Ibid.*, December 1924, p. 3.

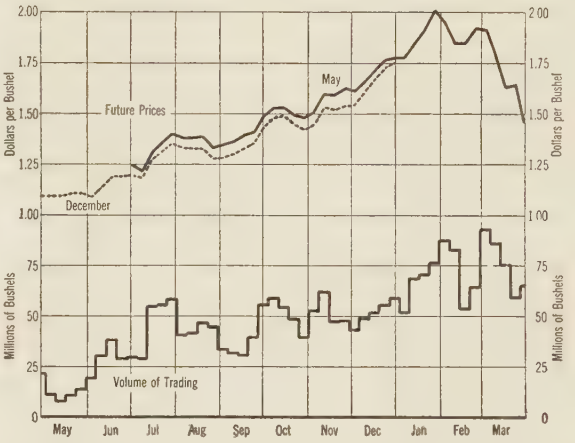
advancing prices. The first half of the winter is ordinarily a period of light deliveries in the wheat market. The bulk of the American and Canadian crops has usually been marketed by that time, and what remains is difficult to transport because of weather conditions. Southern Hemisphere crops are not shipped until January and do not reach European markets in volume until February. This seasonal situation combined with the underlying statistical position of the commodity offered an excellent opportunity for the activities of "bull" traders.

The January advance was merely a continuation of this November-December movement. It was encouraged on the demand side by the addition of Russia and certain countries of southeastern Europe to the list of importers; on the supply side by light deliveries at primary markets in the United States and Canada. Unfavorable weather for the growing crop in the United States was another "bullish" factor, although winter-wheat acreage was reported to be large.

These considerations would not have been sufficient, however, to push the price of wheat to $2.00 a bushel had the futures market not received the additional impetus of unusually large buying by outside speculators. As already stated, experienced professional speculators who were convinced that prices were sure to rise and that there was a profit to be obtained in the May future had been buying contracts for many months. So far as known at present, this was not concerted buying; but cumulated over a period of time it meant that in the aggregate individual professional speculators had large holdings of future contracts. During this time the selling was largely for hedges and for taking profits. A certain number of amateurs had doubtless been "in the market" also for some time; but it was not until the price advance was well developed that this group became an important factor.

Exceptional ease in the money market, which continued almost through December, contributed to promote speculative purchases. In the last half of 1924 money rates were the lowest since pre-war days. The optimism that followed the November election expressed itself in heavy bullish speculation in the stock market and in other commodity markets. Finally, there was a shift of speculative interest from securities to commodities, notably wheat. The result was that trading in wheat, which had been rising during the autumn, reached huge proportions in January. Public participation became widespread. Chart 2 illustrates this increase in speculation with rising prices, showing the average daily volume of future trading in wheat in Chicago, weekly, from May in 1924 to March in 1925,[1] together with average weekly prices of the nearest future.

CHART 2.—PRICES OF DECEMBER AND MAY WHEAT FUTURES AND AVERAGE DAILY VOLUME OF TRADING IN WHEAT FUTURES AT CHICAGO, WEEKLY, MAY 1924 TO MARCH 1925*



* Sources: Prices—Chicago *Journal of Commerce;* volume of trading—U. S. Dept. of Agric., Grain Futures Administration.

Under the stimulus of mounting prices, wheat receipts at primary markets in this country increased.[2] In the Southern Hemisphere wheat poured in to seaports from the country districts, and large overseas shipments got under way. The higher the price rose, the smaller were the European purchases in high-priced markets. Exchange houses raised their margin requirements for traders, and the increasing extension of credits on the wheat market provoked pres-

[1] Daily average transactions by months since 1921, in all exchanges, are given in Appendix Table IX.
[2] See Appendix Tables II and III.

sure toward a more liquid position. Under these combined influences, the market reacted early in February.

The February-March Decline

The February market was a very uncertain one. Fluctuations in prices were large from day to day and the general trend of the market was incoherent and indeterminable. Roughly, however, the first half of the month was a period of declining prices, the second, one of advancing prices. The decline reduced the Chicago quotation from slightly over $2.00 to slightly over $1.80. The succeeding advance returned the quotation to a little under the $2.00 mark.

Through February the country marketing movement in the Northern Hemisphere continued fairly large for this season of the year, considering the volume of previous shipments, while the Southern Hemisphere shipped overseas at an amazing rate. The "visible" afloat increased by 30 million bushels during the month. Europe came into our market whenever the price dipped, but was a cautious buyer. Spain was added to the list of European countries requiring foreign grain, though her import embargo was not removed until April. The underlying statistical position of the commodity was still considered bullish by many operators, but it became increasingly difficult to borrow money with which to buy futures or hold wheat.

In March the market collapsed. For this collapse, as for the December-January advance, no adequate "statistical" explanation can be offered. There had been no important new developments in the underlying supply situation. It was forecast that spring plantings in all parts of the world would be larger than last year, but this might have been forecast at any time during the price advance. The only crop soon to be harvested, the size and quality of which was unknown, was the Indian crop; but whatever news of this was received during the month indicated deterioration rather than improvement. True, it had come to be believed that the Canadian crop was not so small as officially estimated last autumn; but here too the difference was not sufficient to be a major factor in such a price movement. In the United States an official census of farm and country mill stocks indicated a supply considerably smaller than the "trade" had counted on,[1] and weather conditions in important areas of the winter wheat belt were decidedly unfavorable.

Apparently a decline in European demand was the proximate cause for the break. High prices were in themselves deterrents to European buying. But similar reduction in European purchases had occurred earlier in the year—in November, for example—without any such severe price recessions. Supplies afloat March 1 seemed sufficient to provide European import requirements for almost two months. Developments in Germany and France suggested that crops or carryovers had been underestimated, and financial conditions there also became less favorable for importations. As the winter passed and spring came on with no indication of serious damage to the crops, Europe became less apprehensive about supplies. Associated with these factors, however, was the growing conviction that current prices were unjustifiably high.

A "bear raid," or something having that appearance, effected the collapse of the futures markets. Viewed as a market phenomenon, the decline was due to selling pressure on a market feebly supported by buyers. To what extent the professional traders who had purchased futures before January sold out in March is unknown. Domestic hedges were probably a minor factor in either direction, though the transfer of hedges from one month to another and from one market to another undoubtedly operated to shift prices as between months and markets. The irresistible selling pressure consisted, apparently to a large extent, of new elements, supported by heavy stop-loss selling. Small speculators were sold out when they could no longer support the margins. Under the pressure of selling the price had to decline heavily before buyers were uncovered.

At least two new selling factors operated not merely on the Chicago market but also in Winnipeg and Liverpool. One of these

[1] See below, p. 158.

was the sale of futures for the protection of unhedged wheat afloat from the Southern Hemisphere. The second was the sale of May futures by professional speculators who believed the market was "overbought," also that the "longs" were financially overextended, and that therefore a selling campaign could be launched and prices driven down with the expectation of covering before the demoralized prices could be revived.

The close of March did not see the end of the selling campaign. It continued into early April, the lowest point being reached on April 3 and 4 at Chicago when the May future sold for $1.41. Since that time the market has recovered somewhat, but speculative interest has been largely absent. Developments which would have been considered bullish in the January market—such as the low figures for country stocks March 1 and the unfavorable condition reports of the United States winter wheat—have been without obvious influence.

International Comparisons

This description of the advance and decline in future prices holds in general for the leading export markets and for Liverpool, although there have been variations in the rate of movement and in the extent of speculation in the different markets. In a movement of such dimensions, however, the variations are almost submerged in the major fluctuations.

Prices were pushed higher and subsequently declined more in Winnipeg than in the other leading markets. At the peak of the advance there was a difference of 12 cents between Winnipeg and Chicago May futures, while at the end of March the two quotations were approximately on a parity. The Buenos Aires market advanced sharply in the second half of January, and at times during February and March was higher than the Chicago market; but on the whole it was less under the influence of speculation and consequently less subject to fluctuations than the American and Canadian markets. Liverpool prices advanced less rapidly in January than prices in export markets, but the break in the middle of March was of about equal violence. On many days during the period, especially at the times of extreme decline, the spread between Liverpool prices and those of the exporting markets was insufficient to cover costs of transporting the wheat.

The Cash Market

As may be expected in a period of such violent price change, the cash grain business was practically at a standstill and buying was on a hand-to-mouth basis. It was precarious even to hold hedged wheat. Costs of doing business—operations of buying, selling, borrowing money—also increased, and consequently final costs were advanced. Prices of other cereals advanced and declined in sympathy with wheat.

In Liverpool cash prices of imported wheat advanced and declined in more or less the same ratio as the futures contracts. Those types which were hard to obtain declined less severely, however, than the grades in more plentiful supply.[1] Prices of domestic grain in Great Britain and on the continent, while somewhat influenced by prices of imported wheat, did not rise as sharply and have not fallen as abruptly.[2]

To conclude, speculation is the keynote of the recent period as regards the organized wheat markets. Without marked changes in the "statistical position," with great diversity of opinion as to the normal price of wheat, under influences largely psychological in nature, a "bull" movement drove the price up to extreme heights in January, and a "bear" movement brought about a crash in March. The great increase in the volume of trading in this country indicates that the Grain Futures Act has not made large speculation impossible, as its critics have argued that it did. And the movement of prices during the period illustrates the truth of an observation made by a member of a British parliamentary committee in 1801: "In times of plenty speculators tend to keep the market more on a level; in times of scarcity they have it in their

[1] See Appendix Table X.
[2] See Appendix Table XI.

power to influence the market too much."[1]

However, the theory that the break in prices directly injured the farmers of the country has little basis in current experience. There was very little merchandisable wheat still in farmers' hands in March. Growers who had retained wheat through the early winter marketed the bulk of it at $1.50 or better. Speculation probably worked to the benefit of growers rather than to their disadvantage. The trade, the flour millers, and speculators suffered most.

II. SUPPLY AND DEMAND FOR THE CROP YEAR

World Supplies

The broad facts of the supply situation remain substantially as they were described in our previous survey.[2] The world wheat crop of 1924 was short. It was some 385 million bushels below the excellent crop of 1923. While it was only about 40 million bushels below the average of the five years 1920–24, the trend of consumption has been rising during this period. Of the exporting countries, the United States and Australia produced first-rate crops. The Argentine crop, while of low yield per acre, was of fair size. Canadian and European crops were distinctly small, and their quality was so poor as to reduce the proportion available for food uses. This latter factor, however, now seems of less weight than it appeared some months ago. The rye crop, notably in Europe and Russia, was exceedingly poor, even worse than the wheat crop; hence wheat is necessary to supply deficiencies in rye. Potato crops were generally large, affording important substitutes for wheat in Europe. Corn crops in Europe were good; Argentina has apparently an adequate exportable surplus to meet prospective European import requirements. But neither potatoes nor corn could entirely offset the deficiencies in bread grains; and crops of oats and barley, though larger than in recent years, except 1923, afford no important substitutes for wheat as food. On the whole, therefore, the present crop year is one of stringency in bread grains, although the contrast with the excellent year 1923–24 decidedly exaggerates the degree of stringency.

[1] Quoted by C. R. Fay, "The London Corn Market," *American Economic Review*, March 1925, p. 76.

[2] See WHEAT STUDIES, No. 3, February 1925, pp. 78–86.

[3] See below, p. 158.

The last three months have brought a few modifications in previous estimates of supplies. The Canadian wheat crop, officially estimated at 262 million bushels, seems certainly larger than this, by perhaps 20 million bushels.[3] The Argentine corn crop, though poor, has turned out better than was expected some months ago. German and French crops of bread grains, and carryovers, are believed to have been underestimated. On the other hand, it now appears that the Australian government was incorrectly reported, late in January, as estimating the crop at 162 million bushels, and estimates based on state figures are some 13 million bushels lower. The Russian crops have proved even smaller than was earlier anticipated, and Russia is importing very substantial quantities of bread grains. Poland's rye crop is estimated at 7 million bushels less than was estimated in January. The new wheat crop of British India, upon which the exports from India in the later months of this crop year depend in large part, has deteriorated considerably.

These changes do not materially alter previous estimates of total supplies, but such figures are always less important than

TABLE 1.—WORLD (EX-RUSSIA) CROPS OF CEREALS, 1920–24*

(Million bushels)

Year	Wheat	Rye	Corn	Oats	Barley
1920	2894	603	4437	3606	1156
1921	3116	840	4076	3111	1149
1922	3156	848	3972	3375	1203
1923	3499	913	4300	3854	1331
1924	3114 *a b*	738 *b*	3660 *b*	3717 *b*	1220 *b*

* See Appendix Table I, and WHEAT STUDIES, February 1925, pp. 79, 115, 116.

a Probably this is slightly underestimated. See below, pp. 158, 161.

b Including approximations for countries for which data are unavailable.

the relation between exportable surpluses and importers' requirements.

Estimated Net Exports

Our estimate of aggregate *net* exports by the usual exporters, excluding Russia, runs somewhat higher than our previous estimate, published in February. Table 2 summarizes our estimates for the crop year, in comparison with other recent estimates.

Table 2.—Estimates of Net Exports or Shipments of Wheat and Flour, 1924–25

(Million bushels; crop year ending July 31, except as noted)

Area	U. S. Dept. of Agric. February 18	Internat. Inst. of Agric. February	Sir James Wilson March 25	Broomhall (Shipments) March 31	Food Res. Institute April
United States	240–55 [a]	263	240 [c]	260	260 [a]
Canada	175–85 [a]	175	168 [c]	176	184 [b]
Argentina	135–50 [a]	166	168 [c]	152	135
Australia	100–115 [a]	122	120 [c]	104	115
India	35–40 [a]	39	72 [c]	40	35
Other countries (ex-Russia)	10–20 [a]	21	32 [c]	20	20
Total (ex-Russia)	695–765 [a]	786	800 [c]	752	749

[a] Crop year ending June 30.
[b] Crop year ending August 31.
[c] Exportable surplus, not probable exports.

In the light of crop developments in Canada and other developments in the United States and Australia, more fully discussed below (pp. 164, 163), we have slightly increased our estimate of exports from these countries. In view of the deterioration of the new crop in India, we have slightly lowered our earlier figures for that country. The estimates of the International Institute of Agriculture and Sir James Wilson refer to quantities presumed to be available for export, and for that reason are considerably above the other estimates. Sir James Wilson's figures are peculiar in allowing for duplications between Canada and the United States. We believe each of these estimates considerably exceeds the amount that can reasonably be expected to move out before August 1.

Estimated Imports

Wheat import requirements, for the crop year as a whole, appear somewhat larger than they did some months ago. Broomhall (in March) and the United States Department of Agriculture (in February) revised upward their earlier estimates of importers' requirements for the year, both by substantial amounts. While estimates for individual countries can now be made with a greater approach to accuracy than in January, we are disposed to consider our earlier estimates, in the aggregate, in line with more recent evidence, though somewhat increased chiefly because of larger Russian purchases.

Table 3 summarizes our present estimates of European import requirements for the crop year, with other estimates for comparison. Certain countries, notably Czecho-Slovakia, have imported so heavily in the first seven months of the crop year

Table 3.—Estimates of Wheat Imports of European Countries, Crop Year Ending July 31, 1925

(Million bushels)

Area	U.S. Dept. of Agric. February 18	Sir James Wilson March	Broom-hall March 3	Food Res. Institute April
Great Britain and Ireland [a]	210–30	240	232	235
Italy	90–100	80	88	85
Germany	45–60	64	64	65
France	40–50	40	56	38
Belgium	35–45		40	38
Netherlands	25–30		24	27
Scandinavia	20–25		26	26
Switzerland	15–17		18	16
Austria	15–18		18	18
Czecho-Slovakia	20–25		26	24
Poland	5–7			6
Finland	4–6		16 [b]	5
Spain and Portugal			4	4
Greece	15–20		20	20
Others	2–5			5
Total	544–643		632	612
Russia		24	24	24
Turkey in Europe			8	8
Grand total		648 [c]	664	644

[a] Including Irish Free State. [b] Baltic States.
[c] Including countries for which details are not given.

that a materially enlarged estimate for each for the year as a whole must be made. It is estimated officially that Russia will take 500,000 tons of bread grains. Broomhall estimates she will take 24 million bushels of wheat; some close observers place the figure much higher. Poland seems likely to take much less than we estimated some months ago. Among the leading importers, France and Italy seem likely to take somewhat less than was estimated earlier.

In recent months, there has been a partial reversal of the optimism concerning the European economic and financial outlook which was so prominent a feature of last autumn. Extensions of foreign credits, which took place on an enormous scale in the last few months of 1924, have fallen off. There are some indications that European requirements for bread grains are now influenced in slight degree by difficulties in financing imports. This may conceivably operate to restrict purchases.

Efforts to restrict consumption of bread grains have continued, although it is too early to trace their precise effects. There is small reason to doubt that higher prices of bread have restricted consumption and that enforcement of higher extraction of wheat and admixture of substitutes have kept consumption lower than it would otherwise have been. These influences were foreseen several months ago, but their weight bids fair to be greater than the trade expected at that time.

Finally, the present favorable outlook for the new crop in Europe tends to decrease the pressure for imports in the later months of the present crop year, especially in areas of early harvest. If this outlook is borne out by later developments, the carryover in European countries may be safely reduced to small proportions. This factor is taken into account in our estimates.

So far as non-European countries are concerned, the expectations of low imports because of high prices are confirmed by available evidence. Broomhall has reduced his estimate from 112 million bushels last November to 88 million bushels. We are still disposed to accept our original figure of 80 to 90 millions. Lack of current statistical data, however, makes it impossible to reach any closely accurate estimate, or even to check such an estimate after the close of the year.

On the whole, recent evidence supports our earlier conclusion that the supplies genuinely available for export afford no large margin over importers' requirements, even allowing for reduced carryovers at the end of the crop year. But the position has eased somewhat, and the presence of such a margin is of increasing importance as the season progresses.

III. IMPORTS AND EXPORTS

It is now possible to survey the crop movement for more than half of the current crop year. Data as to net imports for leading European importers are available for seven months, ending February, though the figures are by no means comprehensive. Export data are available to the end of March, for the principal exporters.

Heavy European Imports

The available statistics of net imports are summarized in Table 4, for the leading European import areas, with comparable figures for last year and the average for the four crop years 1920–24. For purposes of comparison a fourth column is inserted showing 7/12 of our revised estimates for the year. Monthly data from August 1924 are given in Appendix Table VI, for these and other countries.

It is clear that European countries generally have imported more heavily this year than in any of the past four. Italy is the conspicuous exception. Great Britain, Czecho-Slovakia, and Greece have imported very heavily. Poor crops were a factor in all three cases. Additional factors vary. Great Britain has apparently purchased ahead. The same is probably true of Czecho-Slovakia, whose huge export surplus of sugar has undoubtedly facilitated imports

of wheat and flour. Greece has a larger population to feed because of her million repatriated Greeks, and this year has substantially larger means with which to purchase abroad. Germany also has imported heavily, partly because of the shortage of her wheat and rye crops, partly because of improved economic position and enlarged financial resources. France has imported less heavily than was anticipated earlier. Her crop was probably underestimated and the damage to it exaggerated, while the carryover afforded substantial amounts for this year's consumption. Poland, despite her poor crops of rye and wheat, has not imported heavily, and is presumably economizing materially on bread grain consumption.

TABLE 4.—NET IMPORTS OF WHEAT AND FLOUR IN LEADING EUROPEAN COUNTRIES, AUGUST TO FEBRUARY, 1923–24, 1924–25, IN COMPARISON WITH THE SAME PERIOD IN 1920–24*

(Million bushels)

Country	Average 1920–24	1923–24	1924–25	7/12 of crop year est.
Great Britain and Ireland[a]	121.0	125.3	141.5	137.1
Italy	52.1	31.5	43.7	49.6
Germany	28.9	15.5	46.1	37.9
France	28.7	26.8	23.5	22.2
Belgium	23.3	22.1	21.4 [b]	22.2
Netherlands	12.8	15.1	17.0	15.7
Scandinavia	11.0	16.1	14.8	15.1
Switzerland	10.5	11.4	9.9	9.3
Czecho-Slovakia	7.5	9.5	15.9	14.0
Greece	8.4	11.1	13.3	11.7
Total	304.2	284.4	347.1	334.8

* See Appendix Table VI and Table 3, p. 151.
[a] Including Irish Free State.
[b] February figure estimated.

Russian imports cannot yet be ascertained. The indications are that Soviet Russia will import at least 20, probably 25, and perhaps 30 million bushels of wheat, chiefly in the form of flour milled in countries with which commercial relations have been established. The bulk of these imports, including some seed, has been contracted for since December.

The indications are that Europe has imported relatively more heavily in the first seven months than she will in the last five. In certain cases, notably that of Italy, this is not likely to prove true. Italian imports were very high in January and February, and Italy is likely to take substantial quantities of Argentine wheat in the ensuing three months.

Concerning ex-European imports, available statistical data are very incomplete, as always. Japan and China have taken little wheat, whereas last year, at low prices, they imported heavily. Broomhall's figures of ex-European shipments for the eight months ending about April 1 (see Appendix Table IV) amount to only 56½ million bushels, about 64 per cent of 88 millions, his estimate for the year. This is rather less than usual. It is fair to infer that high prices of wheat have materially reduced ex-European demand.

RAPID MARKETING IN EXPORTING COUNTRIES

The present crop year has been noteworthy for rapid, heavy marketing from the farms in exporting countries. For the United States and Canada, this is shown by Chart 3 (p. 154) and Appendix Tables II and III.

In the United States, receipts at primary markets were extraordinarily heavy in August, in September, and in October. From December onward they have been moderate, and further shipments seem likely to be relatively small. By February 1, 50 per cent of the reported crop had been received at primary markets, a larger percentage of the crop than was thus received in the entire year 1922–23, with a crop of about the same size. Table 5 (p. 154) gives comparable figures to April 1, showing for this year the extraordinarily high figure of 52.4 per cent. This is the consequence of a large crop of high quality in great demand.

In Canada, receipts at the head of the lakes were small in September, because of the late harvest, and in the next four months were smaller than in either of the two preceding years, when the crops were larger. February and March receipts, however, were larger than in the corresponding months of 1923 or 1924. In percentages of the reported crop of the prairie provinces, excluding seed requirements, this year showed by April 1 a larger percentage of

the crop marketed than in either of the two preceding years.

TABLE 5.—WHEAT RECEIPTS AT PRIMARY MARKETS, UNITED STATES AND CANADA, CROP YEARS TO APRIL 1, 1920–21 TO 1924–25*

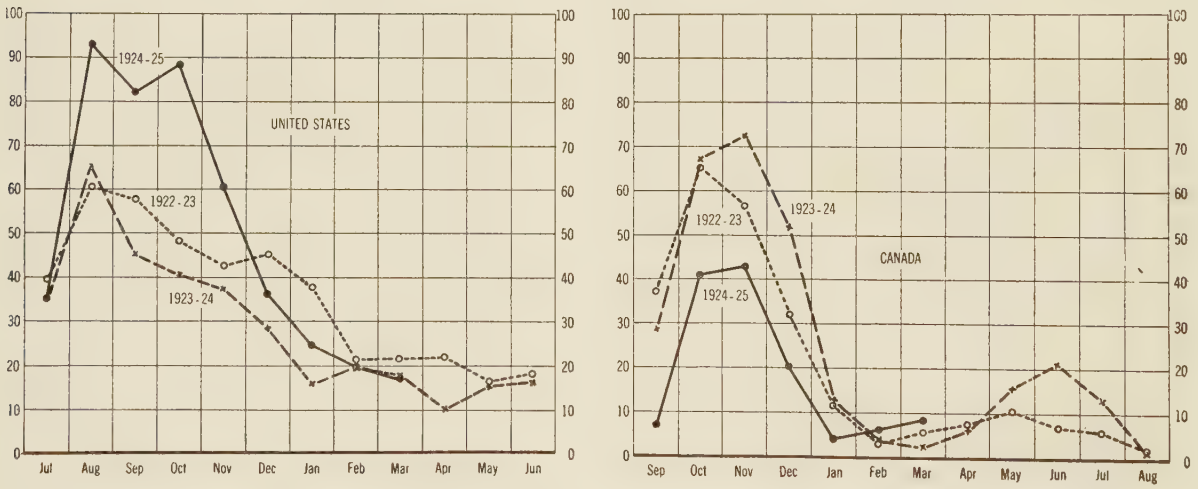
Crop year to April 1	United States (from July 1)		Canada (from Sept. 1)	
	Million bushels	*Percentage of crop*	*Million bushels*	*Percentage of crop a*
1920–21	296.1	35.5	122.6	62.4
1921–22	343.6	42.2	158.4	65.3
1922–23	374.8	43.2	211.7	62.7
1923–24	304.2	38.2	238.8	57.2
1924–25	456.9	52.4	129.8	65.3

* See Appendix Table II.
a Crop of prairie provinces only, after deduction of allowance for seed.

In Argentina and Australia a similar rapid movement has occurred since January 1, which is reflected in the exceptionally heavy exports described below.

CHART 3.—WHEAT RECEIPTS AT PRIMARY MARKETS IN THE UNITED STATES AND AT FORT WILLIAM AND PORT ARTHUR, CANADA, MONTHLY, CROP YEARS 1922–25*

(Million bushels)


UNITED STATES
1924-25
1922-23
1923-24
Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun
CANADA
1923-24
1922-23
1924-25
Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug
0 10 20 30 40 50 60 70 80 90 100

* Sources: U. S. Dept. of Commerce, *Survey of Current Business*, and *Canadian Grain Statistics*.

RAPID EXPORT

Corresponding to the rapid marketing from the farms, there has been an unusually rapid and heavy export. For the period from August 1, 1924, official monthly export figures of five principal exporters are shown in Appendix Table V, with comparable 8-months totals for previous years. From these areas, a total of 549 million bushels was exported in the 8-months period. This was the largest volume ever shipped by these countries in this period, and exceeded the previous record, established last year, by 49 million bushels. Moreover, it bids fair to prove a larger proportion of the exports for the entire crop year than that of any recent year. If we accept for the purpose our liberal estimate of probable exports from these countries for the current crop year, 729 million bushels, we have over 75 per cent of it exported in the first eight months, as compared with the following percentages for the same period in previous years:

1920–21	1921–22	1922–23	1923–24	1924–25
62.4	70.2	70.5	66.7	75.3

Broomhall's figures for international shipments from these and minor areas are summarized in Appendix Table V, covering 34 comparable weeks, slightly less than eight months. These, while differing from the official figures, more particularly for North America,[1] tell much the same story. The

[1] For partial explanation of divergencies, see WHEAT STUDIES, No. 1, December 1924, pp. 34–35. Broomhall's shipments from North America for this period are about 30 million less than the sum of reported net exports from Canada and the United States.

volume of shipments in the eight months ending March 31 establishes a new record. According to Broomhall, shipments to Europe in this period ending March 31 were over 470 million bushels, 80 millions more than the high figure of the preceding year.

These high figures of exports are largely accounted for by the pressure of European demand and by the location of the largest export surplus in the United States, a country in a position to export early in the crop year. Since the Canadian carryover was large and the new crop was small, export of a larger proportion than usual was possible in the first two-thirds of the year, notwithstanding the late harvest. But the continuance of large purchases by importers is indicated by the exceptionally heavy exports from Argentina and Australia in the first three months of 1925. This is illustrated in Table 6, based on Broomhall's figures, which are usually close to the official figures. Shipments made from these two countries from January to March 1925 totaled some 123 million bushels, 24 million bushels more than the largest in any corresponding period of recent years, and constituted over 48 per cent of Broomhall's estimated shipments from these areas for the crop year ending July 31. It must not be assumed, however, that all of this wheat was purchased just prior to shipment. In fact, much of it was purchased before January 1, while on the other hand a considerable volume was shipped on open consignment. Unquestionably this heavy movement, reflected in visible supplies, has had a psychological influence on prices since January last.

TABLE 6.—SHIPMENTS OF WHEAT AND FLOUR FROM ARGENTINA AND AUSTRALIA, JANUARY-MARCH, 1921–25*

(Million bushels)

	Million bushels			Percentage of year's shipment		
Year	Argentina [a]	Australia	Total	Argentina [a]	Australia	Total
1921	17.7	29.4	47.1	27.7	35.8	32.3
1922	51.0	42.3	93.3	43.1	38.2	40.7
1923	48.2	23.7	71.9	34.9	49.6	38.6
1924	65.4	33.7	99.1	37.5	43.3	39.3
1925	60.9	62.4	123.3	40.1 [b]	60.0 [b]	48.2 [b]

* Broomhall's *Corn Trade News*. Figures for 13 weeks to approximately April 1.

[a] Includes Uruguay.

[b] On basis of Broomhall's estimates for the year, respectively, 152, 104, and 256.

The corollary of this rapid movement is that exports in the rest of the crop year must be at a lower rate than usual, if we may trust the statistical evidence of the balance available for export.

IV. WHEAT STOCKS IN EXPORT COUNTRIES AND AFLOAT

With this survey of the crop year as a whole and of imports and exports so far as they are known, it is necessary to consider the position of wheat stocks. In the course of a year the temporary positions at different times may be quite different from what might be assumed from information regarding the crop year, even in conjunction with reported exports and imports. This is notably true in a year so unusual as the present one. Here, therefore, we must consider the commercial supplies and the reported country reserves, so far as these are reported.

STATISTICS OF STOCKS

Information concerning stocks of wheat and flour is quite inadequate. The United States and Canada attempt to ascertain wheat stocks on farms and in country mills and elevators in the middle of the crop year, on March 1 in this country, on March 31 in Canada. Similar figures are available for the end of the crop year, in the United States for July 1, in Canada for September 1 (August 1, after 1924). Data concerning stocks of wheat and flour in city mills and flour stocks in bakeries and in the hands of dealers are not available comprehensively. The Chicago Board of Trade gives a small monthly figure for flour stocks in ten leading cities; *Russell's Commercial Review* gives a larger monthly figure; and the Canadian figures for September 1 give wheat stocks in mills.

Various organizations collect statistics regarding "visible" supplies. The Dominion

Bureau of Statistics publishes weekly figures for Canada. Other reports are unofficial. In this country the Chicago Board of Trade tabulates weekly the wheat stocks held in elevators and other warehouses in twenty-seven places, but the number of units reporting varies from time to time. Bradstreet's collects data similarly from thirty additional, smaller points, and publishes a weekly figure including these with the Board of Trade data, as well as a Canadian estimate. Neither figure is comprehensive, and both vary in completeness from time to time. Broomhall's *Corn Trade News* publishes monthly tabulations, now including the Argentine, Australian, United Kingdom, and "afloat" items, as well as estimates (avowedly based on those of the Chicago Board of Trade but including a substantial additional item) for North America. The detailed items are combined into a so-called "world visible."[1]

Clearly the "visible" bears no definite ratio to the total available supply of wheat. It varies with the merchandising customs and equipment of different countries and with the facilities applied to its tabulation. The largest items in the "world visible," for instance, regardless of the time of year, are usually the North American visible and the visible afloat. This is because the trade here is so organized that large quantities of grain can be carried for relatively long periods of time in elevators or other warehouses and may thus be easily tabulated. In Argentina, on the other hand, no such elevator system exists, consequently there is no ready method of arriving at a satisfactory estimate of supplies in commercial hands. Similarly, the "afloat" item tends to be important because records are easily available showing the quantity of grain in this "position."

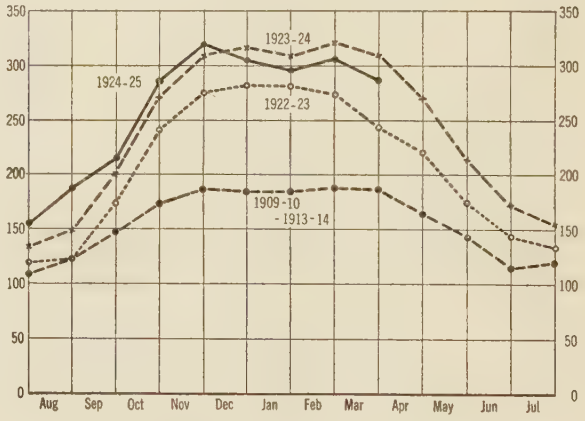
Despite these limitations, the available data concerning visible supplies and other stocks deserve consideration in attempting to survey recent developments and to appraise the situation as of March 1 or April 1.

Large But Declining Visible Supplies

In spite of the admittedly close adjustment between wheat supplies and requirements for the crop year as a whole, "visible supplies" of wheat have remained heavy. This fact is clearly revealed in Chart 4,

Chart 4.—Visible Wheat Supplies, North America, United Kingdom, and Afloat, on the First of Each Month, Crop Years 1909–14 and 1922–25*

(Million bushels)



*Source: Broomhall's *Corn Trade News*.

which shows Broomhall's figures for visible supplies in North America, Great Britain, and afloat on the first of each month since August 1, 1922, and compared with pre-war monthly averages.[2] Up to December 1, 1924, each month showed a higher figure than in any of the three preceding years. Until the present crop year this increase was due primarily to the increasing pressure of supplies upon requirements, which is reflected in the declining wheat prices of 1921–24.[3] The continuation of these high figures in the present crop year is unquestionably due to exceptionally heavy marketing in the United States. From January 1 to March 1 the visible supplies declined, but heavy

[1] See Appendix Table VII for data as of March 1, 1925.

[2] Broomhall's figures for visible supplies in the United States are much larger than Bradstreet's, and still larger than those of the Chicago Board of Trade. The reasons for so great a difference are not apparent. Nevertheless, we have used Broomhall's figures in Chart 4 on the assumption that they form a homogeneous series. The general character of the curve would be much the same in any case, though the comparison of 1921–22 and 1922–23 would be somewhat different.

[3] In addition, it is possible that there is a tendency to hold an increasing amount of wheat in commercial channels and that the compilers of the data have increased the scope.

shipments of Southern Hemisphere crops under the stimulus of high prices prevented a rapid reduction.

Since the period of heavy marketing has passed in the United States and Canada, and Southern Hemisphere shipments are reaching Europe, there is reason to expect a marked decline in visible supplies during the coming months. If the new crops of the Northern Hemisphere continue their present promise or improve, a low figure for visible supplies may be looked for at the end of the crop year.

In the United States the visible has been consistently very large. According to Bradstreet's compilations, as shown by Table 7, in this crop year it has ranged from 18 to 50 million bushels higher each month than the average on comparable monthly dates in the three preceding years. This larger visible is due partly to the large crop of 1924, but chiefly to rapid autumnal marketing not fully offset by milling and export. Since December 1, however, the visible has shrunk rapidly and the margin has greatly diminished, because of reduced receipts from country points.

TABLE 7.—VISIBLE SUPPLIES OF WHEAT IN THE UNITED STATES AND CANADA, 1924–25, COMPARED WITH 1921–24 3-YEAR AVERAGE*

(Million bushels)

Date nearest first of month	United States		Canada	
	1921–24 3-year average	1924–25	1921–24 3-year average	1924–25
1924 July	19.9	38.6	21.7	44.9
Aug.	27.8	46.2	12.1	31.6
Sept.	47.9	79.7	8.6	19.6
Oct.	57.9	91.7	37.8	20.2
Nov.	61.0	100.7	78.4	52.1
Dec.	58.8	109.0	85.6	75.2
1925 Jan.	61.6	99.1	101.4	90.6
Feb.	59.7	84.5	101.1	88.2
Mar.	58.5	76.4	93.8	83.9
Apr.	53.6	65.5	88.6	79.1
May	47.8	—	70.3	—
June	39.0	—	45.9	—

* *Bradstreet's* and *Canadian Grain Statistics.*

The Canadian visible supplies, while consistently smaller since October 1 this year than on the average in the three preceding years, have been large considering the small size of the crop, and have declined only moderately from the peak on January 1. (See Table 7.) This is due chiefly to the large carryover on September 1 and to the rapid marketing from the farms since October 1.

TABLE 8.—VISIBLE SUPPLIES OF WHEAT IN THE UNITED KINGDOM AND AFLOAT, 1924–25, COMPARED WITH 1921–24 3-YEAR AVERAGE*

(Million bushels)

First of month	United Kingdom [a]		Afloat	
	1921–24 3-year average	1924–25	1921–24 3-year average	1924–25
1924 July	6.8	6.8	55.8	55.9
Aug.	6.2	8.4	48.6	41.7
Sept.	7.5	13.4	44.8	34.9
Oct.	6.9	11.0	40.1	43.1
Nov.	6.8	11.0	44.0	62.1
Dec.	6.0	13.0	50.1	59.2
1925 Jan.	6.0	14.9	36.8	38.7
Feb.	5.4	13.8	44.7	55.9
Mar.	4.1	8.8	60.0	85.8
Apr.	5.8	9.5 [b]	61.5	86.0
May	5.9	—	59.2	—
June	5.7	—	57.0	—

* Broomhall's *Corn Trade News.*
[a] Excluding flour. [b] Approximation.

The most striking feature of the visible supplies this year is the relatively large amounts in Great Britain and afloat, as shown by Table 8. Since October 1 these have been consistently higher, usually by considerable amounts, than the average for the three preceding years. This is due largely to the rapid marketing and export from all important export areas, in both hemispheres. In March the volume afloat reached exceedingly high figures, and it was believed that the volume afloat was sufficient to take care of half Europe's import needs to July 1.[1] This view unquestionably had an influence upon prices in March. It should be noted, however, that the volume afloat has recently been exceptionally swollen by large shipments from Australia's excellent crop, for these are counted in the visible for several weeks longer than shipments from nearer export areas.

[1] Broomhall's estimates of the volume afloat have recently been lower, by substantial amounts, than other trade estimates.

Country Stocks

While visibles have been high, there is relatively little wheat at country points behind the visible in North America. In the United States, stocks on farms and in country elevators and mills are small, both absolutely and in comparison with other years. This is indicated by Table 9. According to

Table 9.—Wheat on Farms and in United States Country Mills and Elevators March 1, 1920–25*

March 1	On farms		In country mills and elevators		Total	
	Million bushels	*Per ct. of crop*	*Million bushels*	*Per ct. of crop*	*Million bushels*	*Per ct. of crop*
1920	169.9	17.6	123.2	12.7	293.1	30.3
1921	217.0	26.1	87.1	10.5	304.1	36.5
1922	134.3	16.5	75.1	9.2	209.4	25.7
1923	156.1	18.0	102.9	11.9	259.0	29.9
1924	137.7	17.3	98.3	12.3	236.0	29.6
1925	113.9	13.1	69.1	7.9	183.0	21.0
Average 1920–24	163.0	19.5	97.3	11.6	260.3	31.1

* U. S. Department of Agriculture data.

the Department of Agriculture, country stocks on March 1 were the smallest in twenty years, except in 1918; and the combined total, 183 million bushels, constituted only 21 per cent of the crop, as compared with an average of over 31 per cent of the crop in the preceding five years. Commercial experts consider these figures somewhat too small,[1] but all agree that the figure is unusually low. This low level of country stocks is due primarily to the unusually rapid marketing last autumn, shown in Chart 3 above (p. 154).

For Canada, the Dominion Bureau of Statistics has estimated stocks in farmers' hands March 31 as 39 million bushels, as compared with 42, 55, and 71, respectively, on the same date in 1922, 1923, and 1924. This is hardly more than sufficient to cover spring seed requirements. Since, however, Canadian farmers are accustomed to purchase from seed distributers considerable quantities of seed, part of these stocks may be shipped off the farms.

If, however, one takes the reported Canadian stocks in all positions March 31, some 121.1 million bushels, adds 6 millions for unreported stocks in flour mills, and adds to this the reported exports September-March and an allowance for winter seed and domestic milling, the total of 278 millions is within 12 million bushels of the supplies reported available on September 1, including new crop and carryover. This would leave only 12 million bushels for feed and waste in a year when the crop was of admittedly low quality. That amount is far below the usual figure for feed and waste. It is difficult to escape the conclusion that the crop has been underestimated by perhaps 15 or 20 million bushels. Such a view is held by Canadian trade experts of long experience and high repute.[2]

The carryover of old wheat in Argentina January 1 was officially estimated as 10 million bushels, a normal figure, but much higher than last year's figure, which had been reduced to negligible proportions in view of the bumper crop then being harvested. With a smaller crop this year, and unusually heavy exports since January 1, stocks in Argentina, in spite of the larger carryover, are much lower than a year ago. On April 1 the exportable surplus was officially estimated as 61.6 million bushels, of which *The Times of Argentina* estimates that 11.4 millions were visible stocks in ports.[3] For Australia no satisfactory data are available, but visible stocks were estimated April 1 as 63 million bushels, compared with 40 millions at this date last year.[4]

Conclusion

This discussion brings out the important fact that this year wheat has flowed into commercial channels with unusual rapidity and smoothness. The rise in prices in the first half of the crop year was due—so far

[1] Estimates compare as follows, in million bushels:

	On farms	Other	Total
Government	114	69	183
Murray	117	76	193
Cromwell	121	90	211
Snow	112	95	217

[2] Miss Cora Hind, of the *Manitoba Free Press*, in January estimated the crop of the prairie provinces as 268 million bushels, 32 million bushels larger than the official estimate. Mr. W. Sanford Evans estimates the total Canadian crop as 276 million, without allowing much for non-merchantable wheat, as compared with the official estimate of 262.

[3] Broomhall's *Corn Trade News*, April 7, 1925.

[4] *Idem.*

as it was due to fundamental facts rather than to inflated expectations—to recognition of a close adjustment between supplies and requirements for the crop year. It has not been caused by lack of wheat in known trade positions, for currently available supplies have been abundant, and no abnormal transportation difficulties have arisen. Obviously the position of supplies cannot influence the total volume. It may, however, have some bearing upon prices. There is no doubt that the continued commercial availability of large supplies has been a powerful factor in bringing about the decline in wheat prices from the January peak. When large supplies are in commercial hands in exporting countries, foreign and domestic buyers are frequently able to pick up bargains, as it were, and to hold off from purchasing when prices rise to special heights. Reselling has been prominent in Europe at intervals, all season.

One cannot escape the further conclusion that visible supplies will shrink rapidly in the later months of the crop year, by more than the usual seasonal amounts. If the new crops mature well, the carryover of old wheat at the end of the crop year may be exceptionally low. This follows from the accepted views that country stocks are relatively low and that import requirements for the year leave little margin of exportable surpluses. *Per se* this is a bullish influence. Yet it cannot safely be inferred on this ground that prices must rise above the current levels. This decline may conceivably have been fully "discounted." Changes in the visible are largely a result of price conditions and basic supply conditions; they operate only occasionally as causes of price changes. The volume of visible supplies, and changes in this volume, are not necessarily important price factors, or even indicators of important price factors.

V. THE POSITION AS OF APRIL 1

It is now possible to summarize the position as of March 1 or April 1, and to estimate probable exports in the remainder of the present crop year. The United States situation deserves special analysis, in view of the importance of our export surplus and the peculiar difficulties in estimating the quantities potentially available for export. The dates of gathering data on country stocks, July 1 and March 1, determine the period to be considered.

The United States Position

A common method of computing the amount of supplies available for disposition between March 1 and July 1 and their prospective disposition is shown in Table 10. On this basis, it would appear that the total wheat in the country on March 1 was about 258 million bushels. If this were true, and one makes reasonable allowances for spring seed and domestic milling, there would be only 52 million bushels to cover exports from March to June, for feed and waste during this period, and for carryover July 1 in all positions. This conclusion is untenable. A carryover of 52 millions alone would be extremely low; hence this computation would suggest that practically the entire exportable supply had been shipped out by March 1. Yet exports continue, and no huge imports are taking place.

Table 10.—United States Wheat Supplies March 1, and Defective Estimate of Prospective Distribution March to June, 1925

(Million bushels)

Bradstreet's visible, March 1	75
Stocks on farms, March 1	114
Stocks in country mills and elevators, Mar. 1	69
Total in sight, March 1	258
Estimated flour grindings, March–June	176
Estimated spring seed requirements	30
Total	206
Available for net export and carryover	52

Such a mode of calculation is defective in assuming that invisible or otherwise uncounted stocks are invariable. As a matter of fact, these items may vary considerably between March 1 and July 1, and such vari-

ations would falsify the reasoning given above. The stocks uncounted, including stocks in city mills, are certainly large enough to admit of important variations.[1]

Another procedure is possible which takes into account this possibility of variation in invisible stocks. Table 11 thus accounts as

TABLE 11.—UNITED STATES WHEAT SUPPLIES AND THEIR PARTIAL DISPOSITION JULY 1–MARCH 1, 1923–24, 1924–25

(Million bushels)

	1923–24		1924–25	
Country stocks and visibles, July 1	102		104	
New crop	797		873	
Total	899		977	
Country stocks and visibles, March 1	312		258	
Balance to be accounted for		587		719
Net exports of wheat	44		155	
Wheat ground, July–Feb.	400		405	
Winter-wheat seed	54		57	
Total		498		617
Balance unaccounted for		89		102

far as possible for the disposition of wheat supplies between July 1 and March 1 of the present crop year compared with last. The balance unaccounted for must represent chiefly feed and waste combined with increases or decreases in invisible stocks from July 1 to March 1. This year, at least, this balance unaccounted for is much larger than any estimate of feed and waste for the year. It therefore presumably includes a considerable item of increase in invisible stocks. The balancing item is larger this year than last. Since there is strong reason for believing that feed and waste are smaller this year than last,[2] it is reasonable to infer that invisible stocks were relatively larger on March 1, 1925, than a year before; but how much larger and precisely how they were distributed, no one can tell.

[1] Cf. Millers National Federation, *Bulletin 374*, March 31, 1925.

[2] WHEAT STUDIES, February 1925, p. 97.

[3] By a different procedure, somewhat misleading in its implications, Broomhall has reached the conclusion that the United States exports will amount to 63 million bushels between March 1 and July 1. *Corn Trade News* (daily edition), March 5, 1925.

Table 11 leads up to Table 12, which compares the approximate disposition of wheat supplies for the period July to February with possible figures for the year ending July 1, 1925. The figures for seed and domestic grindings can hardly be far wrong. The figure for net exports is almost a maximum, assuming the crop as officially reported. The figures for stocks at the end of the period and the balancing item are probably not far from a minimum. In this table flour grindings exclude wheat ground for export, whereas in Tables 10 and 11 total grindings are used.

TABLE 12.—POSSIBLE DISPOSITION OF 1924 CROP AND STATISTICAL CARRYOVER, TO MARCH 1, 1925, AND TO JULY 1, 1925

(Million bushels)

	July 1, 1924 to March 1, 1925	July 1, 1924 to July 1, 1925	Net change
Total 1924 crop and statistical carryover	977	977	—
Country stocks and visibles, end of period	258	72	–186
Net exports, wheat and flour	201	260	+59
Domestic grindings	359	505	+146
Seed	57	87	+30
Feed and waste for year, and change in invisible	102	53	–49

Table 12 indicates that if the official figures for crop are correct, a net export of 260 million bushels for the year, or 59 millions from March 1 to July 1,[3] will be possible only on the assumption of small carryover on July 1. This will be feasible if the prospects for the new crop are good, but hardly otherwise. Any material change in estimates of the 1924 crop would correspondingly affect the quantities available for export, carryover, or feed and waste. Such a forecast assumes a considerable increase in invisible or uncounted stocks between July 1, 1924, and March 1, 1925. If these do not exist, a much lower volume is available for export.

SUPPLY DISPOSITION BY LEADING EXPORTERS

We have revised our previous estimates of the disposition of the year's supplies on

the part of leading exporters, in the light of more recent information respecting crops, milling, stocks, and actual exports. The results are set forth in Appendix Table VIII, with comparative figures for two preceding years. Table 13 summarizes these estimates for the current crop year. Such estimates are at best rough approximations, but they serve to tie together figures that otherwise readily become separated and inconsistent.

The net effect of the revisions has been to increase the apparent surplus available for export during the crop year. The Canadian crop seems appreciably larger than was estimated earlier. For the United States later evidence indicates that the estimate for domestic milling was too high.[1] For Argentina and Australia the stocks August 1 now seem to have been higher than estimated previously, and it is reasonable to expect domestic use in those countries to be lower. On the other hand, the report of an official estimate of 162 million bushels for the Australian crop proves unfounded. In the case of India, for which no such detailed estimate is possible, deterioration of the new crop leads us to expect smaller exports from the present crop than we previously estimated.

Table 14 summarizes our estimate of maximum probable exports for the remainder of the crop year, obtained by subtracting from the estimates for the year the reported exports to April 1. These estimates all assume low carryovers out, and may be regarded, in the aggregate, as almost a maximum, although they will leave in the Southern Hemisphere some surplus for export after August 1. The figure for the countries covered is 749 million bushels for the crop year, excluding Russia. Our previous estimate was 725 millions, including Russia, which is now expected to import some 24 million bushels. Since exports through March were approximately 544 million bushels, there appears to remain

[1] Up to February 1925 the monthly census of flour milling used the figures of the 1921 Census of Manufactures as base line. Since then the figures of the 1923 Census of Manufactures have been used. The result is to increase the percentage of the census total contributed by mills regularly reporting each month. Thus, 945 mills which reported regularly in the calendar year 1924 represented 82 per cent of the wheat grindings reported in the Manufactures' Census of 1921. On this basis the grindings for the year by mills subject to report would total 586 million bushels. But 954 mills represented 87 per cent of the total reported grindings according to the Census of 1923. On this basis the adjusted grindings for the year would amount to 569 million bushels. Whether this represents a reduction in total grindings of merchant mills, or represents an increase in the grindings of mills below the reporting limit of $5,000 per annum, is not at present determinable. On the assumption that the change lies in classification rather than in volume of production, we have raised the estimate 3 per cent in order to correspond to the one previously employed. Even this figure is probably too low, since no allowance is made for products of customs mills, which represented 4.4 per cent of the total in 1919, and the allowance of 3 per cent may not fully cover the outturn of merchant mills of a value of less than $5,000 per annum.

TABLE 13.—ESTIMATED DISPOSITION OF WHEAT SUPPLIES BY LEADING EXPORTERS, CROP YEAR 1924–25

(Million bushels)

	United States Year ending July 1	Canada Year ending September 1	Argentina Year ending August 1	Australia Year ending August 1
Supplies	977	306	251	190
Domestic use	642	107	68	46
Available for export and carryover	335 [a]	199	183	144
Export to April 1	217	127	89	80
Assumed carryover	72	15	48	29
Available for export from April 1	43	57	46	35

[a] Including an item of 3 million bushels for shipments to possessions, not included below.

TABLE 14.—WHEAT EXPORTS AND ESTIMATED EXPORT SURPLUSES, 1924–25

(Million bushels)

Area	Year ending	Estimated net exports for crop year	Net exports to April 1	Available for export to end of crop year
United States	July 1	260	217	43
Canada	Sept. 1	184	127	57
Argentina	Aug. 1	135	89	46
Australia	Aug. 1	115	80	35
India	Aug. 1	35	31	4
Total		729	544	185
Other countries (ex-Russia)		20		

for the ensuing months approximately 185 millions, decidedly less than one third. Whether as much as this will be exported depends largely upon the intensity of European demand, and upon the outlook for new crops. On the basis of present information, we expect these figures to be approached but not exceeded.

Margin Over Importers' Requirements

With data now available it is impossible to contrast with these figures the importers' requirements for the same period. Taking our estimates of importers' requirements for the year as some 644 million bushels for Europe, and 85 millions for other importers, we have a total of 729 million bushels, including Russia. This assumes that, with favorable crop prospects in Europe, importers will allow their stocks to fall to small proportions on August 1.

Since export surpluses have been estimated liberally, also on the assumption of small carryovers, it still appears that the adjustment between supplies and requirements will be close, but that there is a margin over import requirements at current price levels. Such a margin appears more ample in April than the same margin in October or January.

VI. OUTLOOK FOR 1925 CROPS

It is still too early to make positive statements regarding the 1925 crops. The Indian crop and those of northern Africa are so far advanced that there is little probability of material change between now and harvest. Elsewhere harvest is six weeks or more away, and the weather between now and the ingathering will be of critical importance in determining the size of crops. Present information, however, justifies certain statements regarding acreage and condition.

Winter-Wheat Acreage

Winter-wheat acreage has been increased over that of last year and the preceding five years; and, outside of the United States and Russia, the acreage abandoned promises to be small. According to the International Institute of Agriculture, countries representing 80 per cent of the wheat area of the Northern Hemisphere have reported an increase in plantings amounting to 3.9 per cent as compared with last year, 2.9 per cent as compared with the average of the five preceding years. Table 15 summarizes the changes in the more important countries. The largest acreage increases over last year have been made in the United States and India, but many European countries have also increased their acreage. The only large reduction has been in Roumania, where last year's reported acreage was exceptionally high. This table does not include reports from Germany or for Russia except the Ukraine. So far no official information is available regarding German acreage, but reports are to the effect that the planting was larger than usual. Russian official reports are to the effect that the areas seeded to winter wheat were as large as or larger than those of the preceding year.

Table 15.—Areas Sown to Winter Wheat 1924–25*

(Thousand acres)

Country	1924–25	Per cent of 1923–24	Per cent of ave. 1919–23
India	32,057	103.9	118.9
Algeria, Morocco, Tunis [a]	7,018	—	—
United States	42,317	106.5	89.1
France	13,330	104.1	107.9
Italy [b]	11,664	103.4	103.6
Spain	9,872	97.2	97.3
Roumania	6,071	91.5	121.1 [c]
Bulgaria	2,384	119.9	110.1
Czecho-Slovakia	1,346	101.2	97.5 [c]
Poland	2,549	99.4	106.4 [d]
Ukraine	5,394	108.1	104.8 [e]
Total reported [f]	135,640	103.9	102.9

* *International Crop Report*, March 1925, p. 110.
[a] Incomplete figure for Algeria.
[b] Spring and winter wheat.
[c] Average 1919–20 to 1922–23.
[d] Average 1921–22 and 1922–23.
[e] Average 1920–21 to 1922–23.
[f] Including small areas not listed above.

Condition of Winter Wheat

The acreage reports afford presumptive evidence, at this time of year, of larger crops of winter wheat. But variations in yield per acre are much more important. Hence the condition at the close of the winter season deserves special consideration. Such reports, now available for most of the important areas, indicate in general a fairly satisfactory though not universally promising condition.

Russian crops have admittedly suffered serious injury during the winter because of irregularities in the weather. According to one statement, said to have emanated from the Soviet Government, it is estimated that one million acres have been lost because of freezing. An additional 1½ million are reported to have been ruined by insects. Total reseeding of this land this spring is improbable because of scarcity of seed. In contrast with the pessimism of this statement, however, is that of the United States Department of Agriculture, issued on April 9, to the effect that unofficial reports show Russian conditions to be about average. The Department further states that "it seems to be generally conceded that there has been considerable loss from winter killing although conditions in the important winter wheat areas of the southwest were more favorable than elsewhere."

In Hungary, Jugo-Slavia, and other southeastern European countries, dry weather has been an important adverse factor; but recent rains have improved the situation, and rapid progress in growth is now reported. Conditions in France, Italy, and Spain, which are the largest winter wheat producers in Europe, have been favorable throughout the season. For Germany, Austria, and Poland the April 1 condition was reported above average. Conditions in Czecho-Slovakia are good. There is every reason to expect that the crops of these countries will be of at least normal size. On the whole, therefore, there is a distinctly favorable outlook for European crops, except in Great Britain. In North Africa, including Egypt, where the crops are now almost completed, they have come through the season very satisfactorily.

The other important winter crops are those of British India and the United States. In India drought has done serious damage, especially in the Punjab. The Punjab crop, normally one third of the total, is forecast at 108 million bushels, against 150 last year. Elsewhere the condition is reported abnormally low. In spite of the increase in the planted acreage, the total crop is officially forecast at 322 million bushels, affording little or no surplus for export.

In the United States the outlook is for a small crop of winter wheat. The April estimate of condition is distinctly low, as shown by the following official percentages of normal:

Season	Dec. 1	April 1
1924–25	81.0	68.7
1923–24	88.0	83.0
1915–24 average	85.6	81.2

Private estimates for April 1 condition are generally somewhat higher, as shown below:

	Per cent
Journal of Commerce	68.4
N. C. Murray	73.0
R. C. Cromwell	74.1
B. W. Snow	75.0

The official report indicates a condition 12.5 points below the ten-year average for this time of year. Since the report was issued, the drought in the southwestern states, which accounts in considerable part for the low condition, has been broken and the weather has been less unfavorable throughout most of the wheat belt.

The extent of abandonment of land sown to winter wheat in the United States has not yet been officially estimated. Official reports indicate, however, that the crop suffered severely from winter-killing from central Ohio to central Indiana, in Montana, in the main wheat areas of Nebraska, Kansas, Oklahoma, and Texas, and in the Pacific Northwest. The freeze in eastern Washington and Oregon caused heavy loss, the condition in Washington being on April 1 only 28 per cent of normal. Drought aggravated the damage in the plains region from Nebraska to Texas, and high winds added to the damage. In Kentucky and Tennessee

the crop has come out of the winter in poor condition from freezing and drought.[1]

The experience of last year, when a radical improvement in the crop occurred after a low June forecast, indicates the danger of relying too heavily upon early condition figures. Nevertheless, if the government condition estimate is correct, it will require radical improvement to bring even normal yields per acre planted. Since winter wheat constitutes the bulk of the United States crop, there is clearly a possibility that the total crop will not exceed 700 million bushels, which would leave little or no representative wheat for export next year.

Spring Plantings

Spring planting in this country has been early and it is the general view of the grain trade in the Northwest that the acreage will be considerably increased over that of last year, particularly the durum wheat acreage. As a whole, the conditions of the soil were at least up to normal, particularly in consideration of the early date. Other things being equal, early seeding is an advantage, and with normal weather conditions the prospects for the spring crop in the spring wheat states and for the reseeded spring wheat in Washington and Oregon are regarded as favorable.

No official report of acreage sown has yet been issued. The report of the United States Department of Agriculture on "farmers' intentions to plant," issued as of March 1, pointed to an increase of about 14 per cent in spring wheat acreage in this country, as shown by Table 16. The bulk of the intended increase was shown to be in the western states where much fall-sown wheat, winter-killed, is being replaced by spring wheat, which may fully replace the losses. In the principal spring wheat belt the intended increase is only 5 per cent. The bulk of this is in durum wheat, for which the intended increase for the four principal producing states is 12.5 per cent.

These reports do not constitute a forecast of planted acreage. The acreage actually planted depends largely upon the conditions for spring planting and upon the condition of winter wheat that might be replanted to spring wheat. For other reasons intentions may change. Moreover, when these reports of intentions to plant were made, wheat prices were at or near their highest levels. Hence, so far as prices exerted an influence upon the farmers' intentions,[2] the influence was presumably at a maximum at this period. This is true not merely of wheat in absolute terms, but of wheat in relation to alternative uses of land.

Table 16.—Intended Planting of Spring Wheat, 1925, as Reported by the U. S. Department of Agriculture

(Percentage of 1924 harvested acreage)

	United States	West north central states	Western states
All spring wheat	113.9	104.9	135.9
Durum wheat	112.5 [a]	113.3	97.4
Other spring wheat	114.4	100.6	136.5

[a] Four states only: Minnesota, North Dakota, South Dakota, Montana.

In Canada the outlook for the spring wheat crop is also promising. Fall plowing in the autumn of last year was somewhat below normal and there was less land in summer fallow. These figures do not mean much, unless interpreted on the ground in accordance with local conditions. The current sentiment in the prairie provinces runs to the effect that the conditions for spring seeding were unusually favorable. In most parts of the prairie provinces the physical condition of the surface was good and a notable amount of deep moisture was present. Other things being equal, the combination of early seeding, good surface, and deep moisture should lead to an expansion of acreage and to a favorable outturn.

In summary, winter wheat acreage has increased, and larger spring wheat acreage is in prospect. Present indications point to poor crops of winter wheat in India, Russia, and the United States, but good crops in Europe and North Africa. The favorable prospects in Europe are especially sig-

[1] U. S. Dept. of Agriculture, Press Release, April 9, 1925.

[2] Studies of the relation between prices and acreage planted indicate that the influence of prices on plantings is easily exaggerated. The influence may, however, be greater this year, when a long period of abnormally low prices has ended.

nificant, since importers' requirements are largely determined by Europe's demand. The early outlook for spring wheat is unusually favorable. On the whole, the world outlook for 1925 crops does not warrant expectations of a repetition of the world shortage of 1924–25 or of the abundance characteristic of 1923–24.

VII. SUMMARY AND CONCLUSION

The foregoing discussion may be summarized briefly as follows:

(1) Extreme fluctuations in wheat prices marked the months of January to March 1925. From the late-January peak of over $2.00 a bushel, prices fell in March to some 50 cents lower, though remaining nearly 50 cents above the level of last May. Exceptionally heavy speculative activity accompanied, and was largely responsible for, the changes in prices during this period.

(2) The basic facts of supply and demand for the crop year have changed little, —chiefly indicating somewhat larger supplies available in exporting countries and increased Russian import requirements. On the whole the position is believed to have eased since January.

(3) Exports have been exceptionally heavy during the first eight months of the crop year, and from Argentina and Australia since January 1. European imports through February have also been heavy, though the exports from the Southern Hemisphere have not yet bulked large in import statistics.

(4) Visible supplies, which have been large in the past three years, have been maintained at high levels by rapid marketing in the Northern Hemisphere and large quantities on passage from the Southern Hemisphere. Stocks behind the visible are unusually low, both in Canada and the United States. Hence a considerable decline in visible supplies is in prospect.

(5) Assuming low carryovers at the end of the crop year in both exporting and importing countries, it appears that the surpluses available for export will cover import requirements for the rest of the year with a small but adequate margin.

(6) The outlook for new crops is fairly promising. Planted acreage has increased. Winter-wheat crops in the United States, India, and Russia are below average, but in Europe and North Africa generally conditions are above average. In the spring-wheat belt of North America there is prospect of increased acreage seeded under favorable conditions. If later developments bear out the present promise, carryovers at the end of the crop year may be safely reduced to small dimensions. But there is a possibility that the United States winter-wheat crop may be so low as to prevent so great reduction here.

Despite the impressive decline, wheat prices remain on a level distinctly higher than that of the past three crop years, as an expression of the closer adjustment between supplies and requirements. It seems probable that carryovers from the 1924 crops, including visible supplies, will be lower at the end of this crop year than at any time since the armistice. Although heavy exports from the Southern Hemisphere and the continuance of large visible supplies played a part in the collapse of wheat prices since January, the expectation of low carryovers has presumably been largely discounted.

It is not yet clear that the wheat market has reached equilibrium since the extreme recession. There is little probability, however, of a fresh outburst of extensive speculation in the present crop. The possibility does exist that there may develop a shortage of desirable wheats in advantageous positions in this country, which would lead to price increases behind the tariff wall. Important changes in world prices in the next few months, if they occur, are likely to be occasioned by changes in the outlook for new crops.

This issue has been prepared by Joseph S. Davis, Katharine Snodgrass, and Alonzo E. Taylor, with substantial assistance from E. Gail Benjamin.

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The data employed are the latest available on April 28, 1925.

APPENDIX

TABLE I.—PRODUCTION OF LEADING CEREALS AND POTATOES IN PRINCIPAL PRODUCING AREAS (EX-RUSSIA), 1924*

(Million bushels; except rice—in thousand short tons of cleaned rice)

Area	Wheat	Rye	Corn	Oats	Barley	Potatoes	Rice
World (ex-Russia)	3,114 [a]	738 [a]	3,660 [a]	3,717 [a]	1,220 [a]	—	—
Northern Hemisphere (ex-Russia)	2,716	734	—	3,631	1,198	—	—
United States	873	64	2,437	1,542	188	455	472
Canada	262	14	10	412	87	94	—
Europe (ex-Russia)	1,081	656	—	1,650	581	—	—
Great Britain and Ireland	55	—	—	207	59	161 [b]	—
France	282	40	18	296	46	559	—
Germany	89	226	—	390	110	1,338	—
Belgium	13	20	—	42	4	87	—
Netherlands	4	14	—	26	3	99	—
Italy	171	6	98	34	9	—	374
Spain	126	30	24	25	60	89	201
Czecho-Slovakia	34	46	10	85	48	228	—
Poland	32	144	—	166	56	987	—
Roumania	74	7	157	60	50	—	—
Hungary	50	23	80	17	15	70	—
Bulgaria	28	4	27	10	14	2	7
Jugo-Slavia	70	6	106	19	15	—	—
North Africa	84	—	—	12	84	—	218 [c]
India	364	—	—	—	145	—	34,720
Japanese Empire	36	—	—	16	111	—	11,952
French Indo-China	—	—	—	—	—	—	3,908
Siam	—	—	—	—	—	—	3,367
Ceylon	—	—	—	—	—	—	173
Philippine Islands	—	—	—	—	—	—	1,285
Java and Madura	—	—	50	—	—	—	3,862
Argentina	191	1	187	53	7	—	—
Australia	149	—	—	—	—	—	—

* Revised to April 20, 1925. See WHEAT STUDIES, February 1925, pp. 79, 82, 115, 116, for sources and less complete data of earlier years.
[a] Including approximations for countries as to which data are unavailable.
[b] Not including Irish Free State.
[c] Egypt.

TABLE II.—WHEAT RECEIPTS AT PRIMARY MARKETS IN THE UNITED STATES AND AT FORT WILLIAM AND PORT ARTHUR, CANADA, MONTHLY, CROP YEARS 1920–25*

(Million bushels)

Month	United States primary markets					Fort William and Port Arthur					Month
	1920–21	1921–22	1922–23	1923–24	1924–25	1920–21	1921–22	1922–23	1923–24	1924–25	
Aug.	39.6	68.6	60.6	65.3	93.0	4.9	3.2	3.7	2.0	1.3	Aug.
Sept.	42.7	61.4	57.7	45.3	82.1	12.6	27.5	37.0	28.3	7.1	Sept.
Oct.	44.6	41.6	48.3	40.5	88.0	32.0	46.2	65.1	67.0	40.9	Oct.
Nov.	37.2	25.6	42.5	37.2	60.5	33.4	40.8	56.8	72.5	42.7	Nov.
Dec.	31.6	24.0	45.3	28.4	36.3	27.9	23.0	32.0	51.9	20.3	Dec.
Jan.	29.0	17.5	37.6	15.9	24.7	7.8	7.7	11.6	12.7	4.1	Jan.
Feb.	21.2	22.7	21.6	19.8	19.9	4.5	4.2	3.2	3.9	6.2	Feb.
Mar.	22.6	20.2	21.7	18.0	17.3	4.4	9.0	6.0	2.5	8.5	Mar.
8 months	268.5	281.6	335.3	270.4	421.8	127.5	161.6	215.4	240.8	131.1	*8 months*
Apr.	23.3	15.6	21.9	10.1	—	3.7	6.1	7.6	6.4	—	Apr.
May	27.0	29.1	16.7	15.4	—	4.4	11.7	10.6	15.8	—	May
June	30.2	21.0	18.2	16.4	—	3.6	5.6	6.9	21.2	—	June
July	62.0	39.5	33.8	35.1	—	4.2	5.4	6.0	13.1	—	July
4 months	142.5	105.2	90.6	77.0	—	15.9	28.8	31.1	56.5	—	*4 months*
GRAND TOTAL	411.0	386.8	425.9	347.4	—	143.4	190.4	246.5	297.3	—	GRAND TOTAL

* Sources: U. S., *Survey of Current Business;* Canada, *Canadian Grain Statistics.*

TABLE III.—WHEAT RECEIPTS AT PRIMARY MARKETS IN THE UNITED STATES, AND AT FORT WILLIAM AND PORT ARTHUR, CANADA, WEEKLY, JANUARY TO MARCH, 1925*

(Thousand bushels)

Week ending	United States primary markets	Week ending	Fort William and Port Arthur
Jan. 3	4,084	Jan. 2	1,872
10	4,097	9	1,456
17	5,288	16	1,047
24	6,305	23	1,112
31	6,321	30	1,268
Feb. 7	6,774	Feb. 6	945
14	5,085	13	1,771
21	4,281	20	1,816
28	3,783	27	2,305
	4,707		
Mar. 7		Mar. 6	2,131
14	4,521	13	2,606
21	3,860	20	2,174
28	3,205	27	2,307

* Sources: U. S., *Price Current-Grain Reporter;* Fort William and Port Arthur, *Canadian Grain Statistics.* For similar weekly data, August to December, 1924, see WHEAT STUDIES, February 1925, p. 118.

TABLE IV.—BROOMHALL'S ESTIMATES OF INTERNATIONAL SHIPMENTS OF WHEAT AND FLOUR, PRE-WAR AND POST-WAR, FOR THE PERIOD AUGUST 1 TO MARCH 31*

(Million bushels)

Area	5-yr. ave. 1909–14	1921–22	1922–23	1923–24	1924–25
North America	138.9	297.9	323.4	310.8	318.5
Argentina and Uruguay	44.6	57.9	77.7	87.7	90.6
Australia	36.1	73.9	31.8	48.0	72.7
Russia, Danube, and Black Sea	157.6	3.7	4.1	38.8	13.7
British India	24.6	0.2	7.6	5.4	27.4
Other countries	6.0	7.4	0.2	11.6	4.4
Total	406.5	441.0	444.7	502.3	527.2
To Europe	353.0	365.4	385.2	390.7	470.6
Ex-Europe	53.5	75.6	59.5	111.5	56.5
(Percentage of crop-year total)					
Total	65.3	68.2	65.7	64.8 [a]	70.1 [b]
To Europe	65.3	66.8	65.7	62.4 [a]	70.9 [b]
Ex-Europe	65.5	75.3	65.7	75.0 [a]	64.2 [b]

* Source: Broomhall's *Corn Trade News.* The figures are totals of weekly shipments for the 34 weeks most closely approximating the period August 1 to March 31 in each crop year.

[a] Total for crop year includes 53 weeks.

[b] Percentages of Broomhall's estimates of 752, 664, and 88 million bushels, respectively.

TABLE V.—NET EXPORTS OF WHEAT AND FLOUR FROM PRINCIPAL EXPORTING COUNTRIES, AUGUST TO MARCH, PRE-WAR AND POST-WAR*

(Million bushels)

8-months period	Total	United States	Canada	Argentina	Australia	British India
5-yr. ave. 1909–14	261.2	77.7	69.6	48.9	38.6	26.4
1920–21	408.7	193.5	135.2	27.5	41.7	10.8
1921–22	459.9	194.0	137.9	60.1	82.3	(14.4) [a]
1922–23	492.1	152.9	213.2	83.9	32.3	9.8
1923–24	500.0	96.2	243.4	96.6	56.9	6.9
1924–25	548.6	210.2	138.3	89.1 [b]	80.1 [b]	30.9 [b]
1924 Aug.	49.0	21.0	11.0	8.4	5.6	3.0
Sept.	63.7	38.9	14.6	5.2	3.4	1.6
Oct.	87.0	53.1	19.4	5.9	3.7	4.9
Nov.	76.5	34.8	31.1	3.8	2.1	4.7
Dec.	71.7	23.6	33.6	7.2	3.7	3.6
1925 Jan.	60.1	12.6	10.0	18.8	14.3	4.4
Feb.	67.6	10.1	7.9	21.6	21.7	6.3
Mar.	73.0	16.1	10.7	18.2 [b]	25.6 [b]	2.4 [b]

* Source: See WHEAT STUDIES, February 1925, p. 102.

[a] Net imports. [b] March exports estimated from Broomhall's shipments.

TABLE VI.—NET IMPORTS OF WHEAT, INCLUDING FLOUR AS WHEAT, BY PRINCIPAL IMPORTING COUNTRIES, MONTHLY, AUGUST 1924 TO FEBRUARY 1925*

(Million bushels)

Month	United Kingdom	Irish Free State	France	Germany	Italy	Belgium	Netherlands	Switzerland	Denmark	Month
1924 Aug.	23.42	2.27	6.00	1.35	5.45	3.38	1.87	1.12	.44	Aug. 1924
Sept.	17.94	1.09	4.23	3.29	2.59	3.92	1.87	.67	.40	Sept.
Oct.	20.01	1.59	4.08	8.33	2.72	4.20	3.88	.70	.71	Oct.
Nov.	21.03	2.13	4.06	12.00	5.03	2.85	2.77	1.57	.95	Nov.
Dec.	20.38	2.28	2.95	9.38	8.66	3.52	3.23	2.29	1.07	Dec.
1925 Jan.	14.47	1.53	.76	7.13	10.02	2.53	1.80	2.72	—	Jan. 1925
Feb.	12.01	—	1.41	4.57	9.23	—	1.60	.80	—	Feb.

Month	Sweden	Norway	Austria	Czecho-Slovakia	Latvia	Finland	Esthonia	Greece	Egypt	Month
1924 Aug.	.91	.13	1.56	2.21	.21	.33	.03	2.08	.42	Aug. 1924
Sept.	.91	.35	1.52	2.61	.16	.30	.02	2.01	.53	Sept.
Oct.	.77	.92	2.02	2.73	.23	.51	.06	1.91	.80	Oct.
Nov.	1.06	.92	1.06	3.20	.20	.44	.08	2.06	.81	Nov.
Dec.	.97	.53	—	2.11	.08	.48	.14	1.54	.68	Dec.
1925 Jan.	.63	.35	—	1.65	.14	.43	.12	1.93	1.12	Jan. 1925
Feb.	—	—	—	1.38	—	—	—	1.79	—	Feb.

* Sources: Official statistics, *International Crop Reports.*

TABLE VII.—BROOMHALL'S ESTIMATES OF VISIBLE WHEAT SUPPLIES ON MARCH 1, 1920–25, COMPARED WITH PRE-WAR AND POST-WAR AVERAGES*

(Million bushels)

	1920	1921	1922	1923	1924	1925	5-yr. ave. 1910–14	5-yr. ave. 1920–24
United States—wheat	84.0	56.0	70.6	103.7				
East of Rockies					105.4	112.8	76.8	83.9
West of Rockies	4.2	2.3	4.1	6.0	7.5	3.4	5.4	4.8
Canada—wheat	30.7	47.5	62.6	87.2	127.4	84.0	37.1	71.1
U. S.—flour as wheat	10.7	9.6	8.4	9.7	9.9	8.8	9.9	9.7
Canada—flour as wheat	.4	.6	.5	.7	.3	.3	.9	.5
Total	130.0	116.0	146.2	207.3	250.5	209.3	130.1	170.0
Argentina	5.2	2.4	7.0	5.2	9.2	9.9	4.6	5.8
Australia	71.0	92.0	60.0	62.0	45.5	[a]	20.0 [b]	66.1
Total	76.2	94.4	67.0	67.2	54.7	[a]	24.6 [b]	71.9
United Kingdom—wheat	6.6	19.0	2.8	6.1	3.4	8.8	9.2	7.6
United Kingdom—flour as wheat	3.6	2.4	1.3	2.2	1.1	2.2	3.5	2.1
Afloat for United Kingdom	18.1	16.1	13.7	10.7	20.4	14.2	11.3	15.8
Afloat for Continent	30.9	27.9	20.1	29.0	28.5	48.6	16.3	27.3
Afloat for orders	15.6	11.0	21.9	19.0	16.7	23.1	17.4	16.8
Total	74.8	76.4	59.8	67.0	70.1	96.9	57.7	69.6
Grand total	281.0	286.8	273.0	341.5	375.3	[a]	212.4 [b]	311.5
Excluding Australia	210.0	194.8	213.0	279.5	329.8	316.1	192.4	245.4

* Source: Broomhall's *Corn Trade News.* For similar tables as of August 1 and December 1 see WHEAT STUDIES, December 1924, p. 57, February 1925, p. 117.

[a] Data incomplete.

[b] Average of 1911–14 for Australia.

TABLE VIII.—WHEAT SUPPLIES AND THEIR DISPOSITION IN LEADING EXPORT COUNTRIES, 1922–25*

(Million bushels)

(*A*) UNITED STATES:
CROP YEARS ENDING JUNE 30

	Approximations		Estimate
	1922–23	1923–24	1924–25
Stocks, July 1	81.5	102.4	104
New crop	867.6	797.4	873
Supplies	949.1	899.8	977
Exports of wheat	154.9	78.8	—
Exports of flour	67.0	77.6	—
Imports (less re-exports), wheat and flour	19.7	27.9	—
Net exports, wheat and flour	202.2	128.5	260
Shipments to possessions	2.8	2.9	3
Seed requirements	91.4	79.4	87
Domestic milling	550.3	496.1	505
Feed and waste		89.2	50
Total domestic use	641.7	664.7	642
Stocks, June 30	102.4	103.7	72

(*B*) CANADA:
CROP YEARS ENDING AUGUST 31

	Approximations		Estimate
	1922–23	1923–24	1924–25
Stocks, September 1	16.0	8.9	26
New crop	399.8	474.2	280 [a]
Supplies	415.8	483.1	306
Exports, wheat and flour	279.1	342.8	184
Seed requirements	39.8	38.0	40
Milled for consumption	40.9	42.2	42
Feed and waste	47.1	33.6	25
Total domestic use	127.8	113.8	107
Stocks, August 31	8.9	26.5	15

(*C*) ARGENTINA:
YEARS ENDING JULY 31

	Approximations		Estimate
	1922–23	1923–24	1924–25
Stocks, August 1	66.6	54.2	60
New crop	195.8	247.0	191
Supplies	262.4	301.2	251
Exports, wheat and flour	142.6	173.0	135
Seed requirements	18.7	20.6	21
Consumption, feed, and waste	46.9	48.0	47
Total domestic use	65.6	68.6	68
Stocks, July 31	54.2	59.6	48

(*D*) AUSTRALIA:
YEARS ENDING JULY 31

	Approximations		Estimate
	1922–23	1923–24	1924–25
Stocks, August 1	29.8	45.4	41
New crop	109.3	125.5	149
Supplies	139.1	170.9	190
Exports, wheat and flour	49.8	85.6	115
Seed requirements	8.9	9.4	10
Consumption	30.4	31.2	32
Feed and waste	4.6	3.5	4
Total domestic use	43.9	44.1	46
Stocks, July 31	45.4	41.2	29

* Sources: See WHEAT STUDIES, December 1924, p. 53. In the main, official data for 1922–23, 1923–24, and for supplies, 1924–25.
a Allowing for underestimate of Canadian crop.

TABLE IX.—AVERAGE DAILY VOLUME OF TRADING IN WHEAT FUTURES AT ALL MARKETS, MONTHLY, 1921–25*

(Million bushels)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1921	39.1	44.1	39.5	52.5	46.1	49.8	45.5	39.6	57.1	54.0	53.7	43.3	1921
1922	36.5	67.9	61.3	48.9	37.4	41.8	34.4	36.2	33.5	32.5	37.6	42.1	1922
1923	36.6	37.0	27.9	48.0	41.0	40.9	32.3	31.4	28.3	30.2	27.1	21.1	1923
1924	14.3	18.1	22.8	18.0	14.4	34.0	53.3	50.0	42.7	61.4	60.9	58.8	1924
1925	73.4	81.0	87.4	—	—	—	—	—	—	—	—	—	1925

* Source: U. S. Dept. of Agriculture, Grain Futures Administration.

TABLE X.—WEEKLY CASH PRICES OF REPRESENTATIVE WHEATS IN LEADING EXPORTING AND IMPORTING MARKETS, DECEMBER 1924 TO MARCH 1925*

(U. S. dollars per bushel)

Month	United States			Canada	Argentina	Liverpool						
	No. 2 Red Winter (Chicago)	No. 2 Hard Winter (Kansas City)	No. 1 Dark Northern (Minneapolis)	No. 1 Manitoba (Winnipeg)	Barletta (Buenos Aires)	No. 1 Manitoba	No. 3 Manitoba	No. 1 Northern Duluth	No. 2 Winter	Pacific White	Argentine Rosafe	Australian
Dec.	1.66	1.51	1.62	1.64	1.54	1.86	1.77	1.76	1.73	1.83	1.79	1.87
	1.73	1.57	1.67	1.69	1.59	1.93	1.81	1.80	1.78	1.84	1.80	1.89
	1.80	1.64	1.74	1.80	1.64	1.97	1.86	1.83	1.88	1.85	1.83	1.91
	1.86	1.71	1.79	1.86	1.68	[a]	1.91	1.92	[a]	[a]	1.90	[a]
	—	—	—	—	—	—	[a]	1.96	—	—	1.96	—
Jan.	1.87	1.75	1.85	1.82	1.74	2.12	1.99	1.95	1.97	1.96	1.96	1.97
	1.87	1.73	1.89	1.88	1.72	2.10	[a]	1.99	1.96	[a]	1.98	1.98
	1.97	1.81	1.90	1.91	1.76	2.12	[a]	2.06	1.99	[a]	2.02	1.98
	2.01	1.84	1.96	1.98	1.89	2.24	[a]	2.16	2.10	[a]	2.14	2.08
	2.14	1.91	2.07	2.14	2.02	2.34	—	—	2.21	[a]	—	2.13
Feb.	2.12	1.90	1.99	1.90	1.89	2.28	[a]	2.18	2.13	[a]	2.13	2.15
	1.97	1.79	1.89	1.91	1.84	2.18	2.16	2.11	2.04	[a]	2.09	2.07
	1.94	1.77	1.89	1.93	1.85	2.20	2.09	2.02	2.05	[a]	2.01	2.07
	1.90	1.82	1.93	2.01	1.94	2.28	2.15	2.08	2.13	[a]	2.08	2.09
Mar.	2.08	1.87	2.02	1.89	1.92	2.24	2.20	2.14	2.10	[a]	2.14	2.09
	1.86	1.74	1.89	1.73	1.88	2.12	2.07	2.03	1.98	1.78	2.05	2.02
	[a]	1.59	1.69	1.68	[c]	1.94 [b]	[a]	[a]	1.85 [b]	[a]	[a]	1.87 [b]
	[a]	1.65	1.69	1.60	[c]	1.79 [b]	[a]	1.85	1.67 [b]	[a]	1.88	1.76 [b]
	—	—	—	—	—	—	1.69	1.67	—	—	1.79	—

* Sources: U. S. prices from U. S. Dept. of Agriculture, *Crops and Markets;* foreign prices from *International Crop Report and Agricultural Statistics,* except Rosafé, No. 1 Northern Duluth, and No. 3 Manitoba, which are from Broomhall's *Corn Trade News.* U. S. prices are weekly averages of daily weighted prices for weeks ending Friday. Foreign prices are for Friday of each week, except Rosafé, No. 1, Northern Duluth, and No. 3 Manitoba, which are for Tuesday.
[a] No quotation. [b] Tuesday prices, March 24 and 31, from Broomhall's *Corn Trade News.* [c] Not available.

TABLE XI.—AVERAGE PRICES OF DOMESTIC WHEATS IN EUROPEAN MARKETS, MONTHLY, AUGUST 1924 TO MARCH 1925*

Month	Great Britain	France (Chartres)	Italy (Milan)	Germany (Berlin)	Great Britain	France (Chartres)	Italy (Milan)	Germany (Berlin)	Month
	s. d. per quarter	*francs per quintal*	*lire per quintal*	*gold mks. per quintal*	*U. S. dollars per bushel* [a]				
1924 Aug.	54–9	101.00	116.00	19.88	1.54	1.50	1.40	1.29	Aug. 1924
Sept.	51–10	106.70	125.25	22.51	1.45	1.54	1.49	1.46	Sept.
Oct.	54–0	113.45	149.20	22.65	1.52	1.62	1.77	1.47	Oct.
Nov.	53–10	119.05	155.50	21.20	1.56	1.71	1.83	1.37	Nov.
Dec.	52–6	120.31	166.12	22.22	1.54	1.77	1.94	1.44	Dec.
1925 Jan.	55–5	127.75	194.80	25.38	1.66	1.87	2.21	1.64	Jan. 1925
Feb.	58–4	131.25	206.00	25.08	1.74	1.89	2.30	1.62	Feb.
Mar.	56–11	132.60	201.00 [b]	[c]	1.70	1.87	2.22 [b]	[c]	Mar.

* Sources: Great Britain, London *Economist;* France, U. S. Federal Reserve Board; Italy, *International Crop Report and Agricultural Statistics;* Germany, *Wirthschaft und Statistik.*
[a] Conversions made at average exchange rates for the month. [b] Average for first two Fridays of March.
[c] Not available.

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AVERAGE PRE-WAR AND POST-WAR FARM COSTS OF WHEAT PRODUCTION IN THE NORTH AMERICAN SPRING-WHEAT BELT

I. SCOPE AND PURPOSE OF THE STUDY

It is generally recognized that money costs of wheat production have risen in both Canada and the United States between pre-war and post-war years. The recent agricultural depression in the Northwest is often charged to the failure of wheat prices to rise enough to counterbalance increases in cost of production. There is a widespread impression that Canada is able consistently to produce wheat more cheaply than the United States. This impression, supported not only by the United States Department of Agriculture and the Dominion Bureau of Statistics, but also by the United States Tariff Commission, is responsible for the 42-cent tariff on wheat. As a matter of fact, however, little is generally known about the degree or the causes of increases in costs of wheat production, about relative costs in Canada and the United States, or even about the meaning of "cost of production of wheat."

Scope and Purpose of the Study
Pre-War Costs, Excluding Land Charges, in Different Areas
Increases in Costs Excluding Land Charges
Post-War Costs Including Land Charges
Canadian and American Costs
The Cost-of-Production Formula and the Tariff on Wheat
Broad Changes in the Level of Costs
Costs in Relation to Farm Prosperity
Summary and Conclusions

The present paper summarizes an extensive analysis of available data on farm costs of producing wheat in the spring-wheat belt of the United States and Canada under pre-war and post-war conditions.

THE AREAS

The spring-wheat belt of North America falls chiefly within the boundaries of the American states of Minnesota, North Dakota, South Dakota, and Montana, and the Canadian provinces of Manitoba, Saskatchewan, and Alberta. During the past twenty years the four American states have produced about 80 per cent of all spring wheat grown in the United States; and the three Canadian provinces have produced about 98 per cent of all spring wheat grown in Canada.[1]

Within these seven political areas as a whole, spring-wheat production is undoubtedly the most important source of farm income. It is not, however, of equal importance in all of the sub-areas. The costs of wheat production are, therefore, not of equal importance to farmers in all of the

[1] See Appendix Table IV.

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seven sub-areas. But in the spring-wheat belt as a whole, no other crop is of comparable importance.

Types of Wheat

Winter wheat, durum wheat, and hard spring wheats of various varieties such as Marquis, Red Fife, Blue Stem, and Velvet Chaff, all are grown in the spring-wheat belt. These varieties differ one from the other in quality, in price, in yield, and to a certain limited extent, perhaps, in cost of production. It is impossible, however, to distinguish in the present paper between different wheat varieties, since available statistical data take no account of such distinctions. In general, hard spring wheat as distinguished from durum and winter wheats constitutes by far the bulk of production, although in Montana, Alberta, and Minnesota winter wheats are or have been of some importance, and in the Dakotas durum wheat is extensively grown. The statistics hereafter employed apply, strictly speaking, to *all* wheat grown in the spring-wheat belt—winter and durum as well as hard spring. But, since hard spring wheat constitutes the bulk of production, generalizations drawn from the cost and profit statistics apply with reasonable accuracy to the production of hard spring wheat.

The Periods

For present purposes the pre-war period is defined as the years 1908–14. This period has definite advantages for the present study, and no important disadvantages. The influence of the war on farm prices and production was not felt until late in 1914; the influence of the crisis of 1907 seems not to have been considerable in the spring-wheat belt during 1908; and certain phenomena, including acreage, production, number of livestock on farms, and yields per acre, all of which are important in interpretation or calculation of cost statistics, were unaffected either by the crisis or by the first year of the war. The post-war period is not susceptible of accurate definition. It is here defined as the years 1921–24. These years have clearly been more similar one to the other than others of the six years which have elapsed since 1918.

The pre-war period may be regarded as a fairly normal period, while the post-war period was largely one of agricultural depression.

Basic Material

Seven cost investigations exist which fall within the pre-war and post-war periods and which present average farm costs representative of costs in sub-areas of the spring-wheat belt. The first of these was conducted by the Bureau of Statistics of the United States Department of Agriculture for 1909.[1] The second and third, modeled upon the first, were conducted by the Canadian Census and Statistics Office for 1911 and 1913.[2] The fourth and fifth were conducted by the Division of Cost of Production and the Division of Crop and Livestock Estimates of the United States Department of Agriculture for 1922 and 1923.[3] In these two investigations costs applicable to geographical divisions rather than to separate states were published; but averages applicable to states have kindly been furnished by the Department. The sixth investigation was pursued by the United States Tariff Commission for 1923 and for the period 1921–23.[4] It presents costs applicable to localities in all seven areas of the spring-wheat belt, and averages applicable to the American and Canadian portions of the spring-wheat belt. The seventh investigation was conducted by the Dominion Bureau of Statistics for 1923.[5]

Adjustments to Secure Comparability

A fundamental difficulty in all comparisons of cost studies is to secure compara-

[1] "Cost of Producing Wheat in 1909," *Crop Reporter*, May 1911, XIII, pp. 36 ff.

[2] "Cost of Grain Production in Canada, 1911," *Census and Statistics Monthly*, March 1912, V, pp. 51–57; "Cost of Grain Production in Canada, 1913," *ibid.*, December 1914, V, pp. 299–306.

[3] "Cost of Producing Corn, Wheat, and Oats, 1922," *Weather, Crops, and Markets*, September 1923, IV, No. 9, p. 218; "Cost of Producing Field Crops, 1923," *Crops and Markets*, June 1924, I, Supp. 6, pp. 176–177.

[4] *Wheat and Wheat Products*, Washington, 1924.

[5] *Cost of Grain Production in Canada, 1923*. Ottawa, 1924. (Partially reprinted from the *Monthly Bulletin of Agricultural Statistics*, June 1924.)

bility between different producers, areas, and periods. Because of divergencies of practice and the inadequacy of resulting data, some critics are disposed to characterize all deductions from farm cost analyses as "solemn nonsense."[1] Certainly there are numerous instances of fallacious reasoning and unsound conclusions from cost studies, especially when the data are employed to deal not with problems of farm management but with issues of broad economic significance.

These difficulties are present in the basic data employed in this study. Only scattered years are represented. The data are not equally inclusive. Certain important deficiencies exist. Accordingly, the first task has been to construct, on the basis of this material, constituting the best available information, schedules of average costs of wheat production, in the several areas concerned, for the average year of the period 1908–14 and that of the period 1921–24. For this purpose the American studies of 1909 and 1923, and the Canadian studies of 1911 and 1923, have furnished the principal material.[2]

It has been considered desirable to calculate average yearly costs incurred during the pre-war and post-war periods rather than to compare Canadian costs in 1911 with American costs in 1909 or even costs in both countries in 1923 alone. Yield has a strong effect upon costs; and every year is in a sense an exceptional year. Comparisons of costs applicable to given years are often more misleading than comparisons of costs applicable to periods, particularly when costs in one area are obtained for one year, while costs in a second area are obtained for another. When costs applicable to the same areas over periods neither too long nor too short are taken, comparisons may have more than ephemeral significance.

The laborious procedure of adjustment, approximation, and expansion of reported costs into comparable averages for the different areas before and since the war is omitted here but is set forth in detail, together with some considerations respecting the reliability of the resulting figures, in a mimeographed document obtainable from the Food Research Institute on request. The official data for specific years, and our adjusted and expanded data, which furnish the basis for discussion in this study, are given in Appendix Tables I and II.

The resulting statistics cannot be regarded as highly accurate. At many points rough approximations have been necessary. Even so, they are perhaps not much more inaccurate than current statistics of acreage, yield, production, and farm price; and since pains have been taken, without bias, to make reasonable estimates and adjustments with the object of securing comparability, the figures are believed to afford a satisfactory basis for the discussion here presented.

Deficiencies of Adjusted Data

Five deficiencies in the cost statistics hereinafter employed may be emphasized here. In the first place, no costs can be determined for any area in each of the years of each period, desirable though a yearly series may be for the study of yearly variations. Second, pre-war land charges cannot be determined on what is at present recognized as the soundest basis—by averaging actual and potential cash rentals. Third, the costs of abandonment are not determinable on the basis of available data. Fourth, average costs can be calculated only to apply to political areas, not to natural economic areas, of the spring-wheat belt. Finally, the basic data do not provide information on the costs of transportation from local elevators to central markets; the costs hereinafter employed are farm costs of production, not total costs of production.

All of these deficiencies are unavoidable. They are for the most part inherent in the basic data. Their effects on conclusions

[1] Editor, *Farm Journal,* November 1924, p. 12.

[2] The Canadian study of 1913 could not be used because it did not record yields of farmers reporting costs. The American investigation of 1922 was disregarded to simplify necessary calculations. Farm management cost investigations, several of which have been conducted in restricted areas of the spring-wheat belt in one period or the other, have been ignored except for certain supplementary information, because their results are not representative of the larger areas. The Tariff Commission investigation has been useful in calculating land charges for the post-war period, and otherwise. Additional information has been utilized in supplying deficiencies or otherwise supplementing the reported data.

drawn from adjusted data have not, however, been disregarded.

Scope of This Paper

The primary purpose of this paper is to extract from such figures what significance they contain and to indicate what significance they, and similar schedules, do not possess. It may serve to augment current knowledge by systematizing and comparing available data, and also to correct some erroneous impressions concerning differences in American and Canadian costs and the utility of wheat-cost statistics.

Sections II, III, and IV deal with detailed comparisons of costs incurred in different sub-areas of the spring-wheat belt in the pre-war and post-war periods, with special reference to the causes of variations in costs. Section V considers the relation of American spring-wheat costs to Canadian. In Section VI certain important difficulties involved in basing a tariff on wheat upon differences in Canadian and American costs are pointed out. Section VII deals, on the whole inconclusively, with the possibility of a change in the level of real costs and the influence upon the wheat-price level of a change in the real cost level of wheat production. The final section deals with variations in profits, but chiefly with some limitations upon the use of profit figures in the measurement of farm prosperity.

II. PRE-WAR COSTS, EXCLUDING LAND CHARGES, IN DIFFERENT AREAS

Farm costs of producing wheat may be expressed either per acre or per bushel, in either case exclusive or inclusive of land charges. Each of these forms has its appropriate use. Costs per acre excluding land charges best reflect differences in technical conditions of wheat production. Costs per acre including land charges best reflect financial and technical conditions combined, and are needed for discussion of profits and farm prosperity. Costs per bushel including land charges are necessary in judging the relative ability of areas to produce cheaply. Costs per bushel excluding land charges serve the same purpose, but less satisfactorily.

For the pre-war period, land charges cannot be satisfactorily computed; hence no analysis of variations in costs including land charges is possible for the pre-war period, and no comparison of pre-war and post-war costs including land charges is possible. In this section pre-war costs excluding land charges, among the seven political subdivisions of the spring-wheat belt, are considered with special reference to the degree and causes of variations in costs.

Costs per bushel, though they and not costs per acre partially indicate competitive ability in production because they give due weight to the influence of yield, are not easily analyzed without reference to costs per acre. Yield is not the only factor influencing cost per bushel and competitive ability; yet the influence of these other factors is easily obscured in reviewing costs per bushel alone. Costs per bushel run into small rather than large numbers; and costs per acre serve to show the influence of factors other than yield on costs much more clearly. Consequently both costs per bushel and costs per acre excluding land charges are employed in the present section. Costs per bushel display—so far as they can do so when land charges are not included—the relative competitive ability of the various areas. Costs per acre are of service in explaining the causes influencing competitive ability. The determination of these causes constitutes the chief purpose of the present section.

The Factors Causing Variations and Increases in Costs

When average farm costs per acre excluding land charges differ between two areas in the same period, the difference can be due only to differences between the two areas in prices of materials or of labor, or in quantity requirements.[1] Similarly, net

[1] By "quantity requirements" is meant simply the amounts as distinguished from the wage rates and the prices of materials employed in production.

changes in prices and in labor and materials requirements have also caused all increases in costs per acre between the pre-war and post-war periods.

These price and quantity concepts, however, must be subdivided for purposes of clarity. In the spring-wheat belt seven factors have been influential in causing variations and increases in costs per acre. These factors are prices of labor, prices of materials, yields per acre, farm machinery and methods, the practice of summer fallowing, the adequacy of transportation facilities between farms and local markets, and the practice of new breaking.

These seven factors are amenable to statistical treatment only in a limited degree.[1] Yield per acre is known for all areas, though perhaps not with a high degree of accuracy. Labor rates can be computed for all areas in certain years, but Canadian figures are not strictly comparable with American. Prices of certain materials may be roughly ascertained for the United States as a whole, but not for Canada. Statistics of summer fallowing are available for Canadian areas, but only to a limited degree for American areas; and such statistics applicable to the pre-war period are decidedly deficient. The same is true of statistics of new breaking. The adequacy of transportation facilities is difficult to ascertain for any areas, although information of a general sort exists. The effect of improved farm machinery, though presumably of considerable importance, is not subject to definite measurement.

Three factors—yield per acre, summer fallowing, and new breaking—deserve special comment.

High yield per acre affects costs per bushel both as an advantage and as a disadvantage. High yield increases per acre costs of threshing and marketing by increasing the quantities of grain per acre to be threshed and marketed. Hence, in a sense, it also increases cost per bushel, since cost per bushel is obtained by dividing cost per acre by yield per acre. High yield of course decreases cost per bushel by increasing the divisor in the calculation.

[1] See Appendix Tables VI–X for available statistical data.

The practice of summer fallowing increases per acre costs both excluding and including land charges, because it necessitates extra cultivation and because it involves double charges for land. The crop of wheat grown on fallow should be charged with all the cultivation which it has had applied to it, whether or not that cultivation was done over two years rather than one. Similarly it should be charged with two years' taxes or rents. If the yield obtained from fallowing is sufficiently large, costs per bushel may not be increased, although costs per acre must be.

To break new sod also involves additional expense through the greater labor required for plowing and cultivation. Land newly broken must be disked and harrowed more intensively than old land, if a suitable seed-bed is to be obtained.

Variations in Pre-War Costs Excluding Land Charges

Table 1 shows average yearly costs per acre and per bushel, excluding land charges, in the seven areas of the spring-wheat belt during the pre-war period. Costs per acre in Alberta were highest, being 61 per cent above costs in South Dakota. Costs per bushel, however, were highest in North Dakota, being 61 per cent above costs in Montana. Obviously, low per-acre costs do not accompany low per-bushel costs; nor do high per-acre costs accompany low per-

Table 1.—Average Yearly Pre-War Costs Per Bushel and Per Acre of Producing Wheat in Seven Areas of the Spring-Wheat Belt, Exclusive of Land Charges

Area	Cost per bushel *a* $	Per cent above lowest cost	Cost per acre *b* $	Per cent above lowest cost	Yield per acre *c* *bu.*
Montana	.412	—	10.23	54	24.8
Manitoba	.503	22	8.96	35	17.8
Alberta	.508	23	10.72	61	21.1
Minnesota	.568	38	7.95	19	14.0
Saskatchewan	.581	41	10.63	60	18.3
South Dakota	.610	48	6.65	—	10.9
North Dakota	.663	61	7.36	11	11.1

a Calculated by dividing cost per acre (column 3) by yield per acre (column 5).
b From Appendix Table II.
c From Appendix Table VI.

bushel costs. The relation between costs per acre and costs per bushel is such that a sharp distinction must be made in speaking of "the cost of wheat production." The words may have quite different meanings as different kinds of costs are considered.

Table 2 throws some light on the causes of variations in costs among the different areas. The table arrays the seven areas, in the pre-war period, with respect to costs per bushel and per acre excluding land charges, as well as with respect to the major factors affecting those costs. In certain instances the array is arbitrary; and relative ranking in prices of materials and farm efficiency, which also affect costs, is impossible to ascertain. The table helps to explain, however, some rankings of areas in costs per bushel which seem at first glance unusual in view of yields.

Differences in yield per acre explain why costs per bushel were lower in Montana than in North and South Dakota, lower in Alberta than in Saskatchewan, lower in Minnesota than in South Dakota. But why could wheat be produced at a lower cost per bushel excluding land charges in Manitoba than in Alberta or Saskatchewan, when the last two areas obtained higher yields per acre? Compared to the neighboring provinces, Manitoba enjoyed the advantages of lower labor rates, lower expenses for new breaking, lower expenses due to better transportation facilities, and lower yields, although summer fallowing charges were presumably higher in Manitoba than in the other two provinces because a larger proportion of Manitoba's crop was produced on fallowed land. Higher expenses for fallowing were evidently offset by lower expenses for labor, marketing, and new breaking.

Why, again, were costs per bushel excluding land charges lower in Minnesota than in Saskatchewan, when yield per acre was only 14 bushels as against 18.3 bushels in Saskatchewan? Saskatchewan costs were lower than Minnesota costs so far as they were influenced by labor rates and higher yields alone. Minnesota, on the other hand, was better equipped with transportation facilities, incurred practically no expenses for summer fallowing or new breaking, and had the advantage of lower yield so far as lower yield constitutes an advantage. Here the necessity for summer fallowing and the practice of new breaking sufficed to raise costs per bushel in Saskatchewan, as compared to those in Minnesota, more than good yield and lower labor rates could lower them. This instance constitutes the most striking illustration of the fact that costs per bushel excluding land charges—and hence competitive ability, so far as costs per bushel excluding land charges indicate that ability—do not depend on yield alone.

Where, however, wide differences in yield occur — as between Montana with 24.8 bushels per acre and North Dakota with 11.1 bushels per acre—the high yield areas will in general be the areas of low costs per bushel excluding land charges. When yields are more nearly equalized between areas, other factors affecting costs appear more effective and important.

TABLE 2.—RANK OF SEVEN AREAS OF THE SPRING-WHEAT BELT IN COST OF PRODUCTION AND RELATED FACTORS UNDER PRE-WAR CONDITIONS*

Cost per bushel *a*	Cost per acre *a*	Yield per acre *b*	Labor rates *a*	Summer fallow *a*	New breaking *a*	Transportation facilities *c*
Montana	South Dakota	Montana	Manitoba	Minnesota	Minnesota	Minnesota
Manitoba	North Dakota	Alberta	Saskatchewan	South Dakota	South Dakota	South Dakota
Alberta	Minnesota	Saskatchewan	Alberta	North Dakota	North Dakota	North Dakota
Minnesota	Manitoba	Manitoba	Minnesota	Montana	Manitoba	Manitoba
Saskatchewan	Montana	Minnesota	South Dakota	Alberta	Montana	Saskatchewan
South Dakota	Saskatchewan	North Dakota	North Dakota	Saskatchewan	Saskatchewan	Montana
North Dakota	Alberta	South Dakota	Montana	Manitoba	Alberta	Alberta

* Rank of various areas in factors affecting cost is based upon Appendix Tables VI, VIII-X.
a Lowest first. *b* Highest first.
c Best equipped first. By "transportation facilities" is meant distance from farms to elevators and quality of roads over which grain must be hauled.

If land charges could be calculated for the pre-war period, a much smaller range between areas in costs per bushel, and hence in competitive ability, would probably be shown. Land charges should, theoretically, tend to be higher in areas of higher yields, but whether or not this tendency was present in the pre-war period cannot be determined from the data which is available.

III. INCREASES IN COSTS, EXCLUDING LAND CHARGES, IN DIFFERENT AREAS

We may now turn to post-war costs per bushel and per acre excluding land charges. These are shown in Table 3, together with percentage ranges in costs and percentage increases in post-war costs over pre-war costs. Since land charges may be approximated for the post-war period, we need not discuss the variations of costs excluding land charges among the different areas; for costs excluding land charges are of little significance compared to costs including land charges in indicating competitive ability. Changes in factors affecting costs exclusive of land charges are, however, of considerable importance in view of their bearing on comparative costs in Canada and the United States, as discussed in Section V. They also help to explain the rank of areas in competitive ability so far as that rank is determinable.

Costs excluding land charges, whether per bushel or per acre, differed considerably less between areas in the post-war period than in the pre-war. The highest pre-war per-bushel and per-acre costs were 61 per cent above the lowest; but the highest post-war per-acre cost stood only 41 per cent above the lowest, and the highest post-war per-bushel cost stood only 20 per cent above the lowest. Sharp increases in costs, both per acre and per bushel, occurred in all areas between the two periods; but increases were more marked in some areas than in others. Thus per-bushel costs excluding land charges rose 136 per cent in which ranked fifth before the war, ranks first after the war. Manitoba falls from second place to fifth. The other areas maintain much the same relative rank in both periods.

Table 3.—Average Yearly Post-War Costs Per Bushel and Per Acre of Producing Wheat in Seven Areas of the Spring-Wheat Belt, Exclusive of Land Charges

Area	Basis: Cost per bushel *a*	Per cent above lowest cost	Per cent increase over pre-war cost	Cost per acre *b*	Per cent above lowest cost	Per cent increase over pre-war cost	Yield per acre *c*
	$	%	%	$	%	%	bu.
Saskatchewan	.815	—	40	13.37	33	26	16.4
South Dakota	.854	4	40	10.08	—	52	11.8
Alberta	.864	6	70	13.13	30	23	15.2
Minnesota	.868	6	55	12.59	25	57	14.5
Manitoba	.892	9	77	13.29	32	48	14.9
North Dakota	.977	20	47	11.14	11	51	11.4
Montana	.981	20	136	14.22	41	39	14.5

a Calculated by dividing cost per acre (column 4) by yield per acre (column 7).
b From Appendix Table II.
c From Appendix Table VI.

Comparing Table 1 and Table 3, one is struck by the shifts in relative position in respect to costs per bushel. Montana, which was the low-cost area before the war, becomes the high-cost area. South Dakota, which was the area of second highest costs before the war, has the second lowest costs per bushel after the war. Saskatchewan, Montana but only 40 per cent in South Dakota and Saskatchewan. Increases in costs in all areas and the equalization of costs between areas are the significant developments between the pre-war and post-war periods. It is of interest to determine what changes in factors affecting costs have contributed to these developments.

Factors Affecting Increases

The factors making for increases in costs per bushel excluding land charges were three: (1) increases in prices of labor and materials; (2) increases in quantity requirements due to extension of the practice of summer fallowing; and, in certain areas, (3) decreases in yield per acre. Since general increases in costs per bushel have occurred, these factors have been stronger in their influence than have counteracting factors. These counteracting factors have been (1) the improvement and equalization of transportation facilities; (2) the improvement of farm efficiency as brought about by better machinery; (3) the decline of new breaking; and, in certain areas, (4) increases in yield per acre.

Little need be said of the improvement in transportation facilities between the two periods. The improvement has probably been most marked in Saskatchewan, Alberta, and Montana, the areas where transportation was least developed in the pre-war period. At present, one area is about as well served with railroads and local elevators as another, but hauling distances are greater in the more newly settled areas. The tendency has been to equalize transportation facilities in all respects by extension of the railway network and by improvement of country roads, and thus to iron out conditions making for inequalities in costs. Much the same is true of farm efficiency, although equalization between areas has probably not taken place. The use of the gang-plow, the five- and six-section harrow, and the small combined harvester and thresher has everywhere, so far as can be determined, become more common, but presumably not more so in one area than in another. Prices of materials have likewise probably increased about as much in one area as in another. On all these matters statistical evidence is deficient. About yield per acre, labor rates, summer fallowing, and new breaking, more definite information is available.

Average yields per acre as between the two periods increased very slightly in Minnesota, North Dakota, and South Dakota (from 14 to 14.5, 11.1 to 11.4, and 10.9 to 11.8 bushels per acre, respectively); decreased somewhat in Manitoba and Saskatchewan (from 17.8 to 14.9 and from 18.3 to 16.4 bushels); and decreased considerably in Montana and Alberta (from 24.8 to 14.5 and from 21.1 to 15.2 bushels). The pre-war range in yield per acre was from 10.9 bushels in South Dakota to 24.8 bushels in Montana, while the post-war range was much smaller—from 11.4 bushels in North Dakota to 16.4 bushels in Saskatchewan. Other things being equal, the reduced variation in yield per acre would tend to have the effect of equalizing costs. This effect is clearly evident.

These increases and decreases in average yields per acre may be partially due to the accident of season in the years which go to make up the averages. It is none the less possible that the slight increases in yield shown in Minnesota and the Dakotas have been partially due to the development and cultivation of new varieties, most notably durum, the highest yielding of spring wheats. The decreases in average yield in Montana and Alberta, and perhaps also in Saskatchewan, have been due, in part, to the process of expanding wheat acreage to include relatively poor land. Other developments affecting average yield per acre, such as increased diversification, soil exhaustion, abandonment of poor land and the taking up of good land, and increasing inroads of weeds, pests, and diseases, have also taken place between the two periods. But these developments appear to have been largely compensating; and it remains probable that increases and decreases in average yield have been due either to the accidents of seasons included in averages, to the introduction of new varieties, or to the expansion of wheat production.

The practice of summer fallowing has increased greatly in Manitoba, Saskatchewan, Alberta, and Montana, and has tended to increase costs per acre, perhaps per bushel, in those areas. During the post-war period, about 50 per cent of all wheat in Manitoba, 40 per cent in Alberta and Saskatchewan,[1] 20 to 25 per cent in Montana,[2] and 6 per

[1] See Appendix Table IX.

[2] Estimate of the Department of Farm Management, Montana.

cent in North Dakota,[1] was grown on fallowed land. For the pre-war period, complete data are not available; but about 35 per cent of all wheat in Manitoba and 25 per cent in Saskatchewan and Alberta, appear to have grown on fallow. New breaking decreased relatively in all areas, notably Montana, Alberta, and Saskatchewan[2]; but the decrease was less sharp in Manitoba, since the practice had been less general there during the pre-war period.

During the pre-war period the Canadian provinces appear to have enjoyed labor rates substantially lower than rates in the United States. This advantage seems practically to have disappeared during the post-war period, and with it the tendency for wages to vary considerably between different areas. In the pre-war period, the extreme range of wages was from $30.35 per month in Manitoba in 1914 to $54.00 in Montana in 1913; but in the post-war period wages ranged only from $50.00 in Minnesota in 1922 to $69.10 in Montana in 1924. Wages in Montana are still substantially above wages in all other areas, but not so far above as was true in the pre-war period.[3] The effect of the reduction in the range of labor rates has been, like the effect of reduction in the range of yield per acre, to equalize costs of production between the different areas.

The most striking increases in costs per bushel excluding land charges, those of 136 per cent, 77 per cent, and 70 per cent in Montana, Manitoba, and Alberta, have clearly been due chiefly to decreases in yield per acre—decreases of 10.3, 2.9, and 5.9 bushels, respectively. Percentage increases in cost per bushel might be expected to correspond directly with decreases in yield; but apparently the increase in cost per bushel was greater in Manitoba than in Alberta, in spite of a smaller decline of yield per acre in Manitoba. Other factors were therefore important. Their relative importance in these areas and in others is most apparent on analyzing percentage increases in costs per acre.

[1] R. E. Willard, "Cost of Production and Farm Organization." *North Dakota Agricultural Experiment Station Bulletin 165,* December 1922, p. 65.

[2] See Appendix Tables V and X.

[3] See Appendix Table VIII.

Post-war costs per acre in Minnesota were 57 per cent, and in North Dakota, South Dakota, and Manitoba, 51 per cent, 52 per cent, and 48 per cent above pre-war costs. In Minnesota, North Dakota, and South Dakota this 51 to 57 per cent increase was for the most part caused by rising prices of labor and materials, but partially also by a slight increase in yield per acre. In Manitoba much the same percentage increase in cost was due not at all to increase in yield, but to price increases as well as to increases in labor requirements caused by the increasing practice of summer fallowing. Yield decreased, thus lowering cost; but its effect was quite offset by increases in prices and in summer fallowing. Costs per acre in Montana increased only 39 per cent. The increase was less than that in Manitoba because yield per acre and new breaking declined more in Montana than in Manitoba, while wage rates increased less sharply. These developments prevented costs from rising as high in Montana as they rose in Manitoba, in spite of the fact that summer fallowing increased quite as much, if not more, in the former area. In Saskatchewan and Alberta, costs per acre increased only 26 per cent and 23 per cent, respectively. In these areas, as in Montana, new breaking decreased, summer fallowing increased, and yields decreased. But summer fallowing increased less, and yields decreased less; and hence Montana costs rose higher. The difference between the percentage increases of costs in Manitoba compared to Saskatchewan and Alberta is explicable chiefly by the greater increase in the practice of summer fallowing in Manitoba, on the one hand, and the greater decrease in the practice of new breaking in Alberta and Saskatchewan on the other.

Clearly wages of labor and prices of materials have not been the only important influences on costs of production in the spring-wheat belt, though these two factors are commonly regarded as more significant than any others. Yield per acre, new breaking, and summer fallowing have also been of considerable importance in causing both variations in costs between areas and increases in costs between periods.

IV. POST-WAR COSTS, INCLUDING LAND CHARGES, IN DIFFERENT AREAS

For the post-war period it is possible to obtain approximate land charges per acre, and hence to calculate costs inclusive of these charges. Such costs throw more light on relative competitive ability, and therefore deserve special consideration. Here the discussion will be confined to the comparison of costs including land charges among the various political sub-areas.

Calculation of Land Charges Per Acre

Average yearly land charges per acre can be most satisfactorily computed on the basis of the Tariff Commission's cost investigation of 1923. Here, and here only, can be obtained land charges applicable to all areas (though only for the single year 1923), compiled on an identical basis for all areas, including summer fallowing charges, and applicable to wheat land rather than to all farm land. Detailed reasons for employing the Tariff Commission figures in preference to any others are set forth in the mimeographed supplement to this study, reference to which has been made above. Methods of calculation are also given there in detail.

The Tariff Commission recorded average cash rentals actually paid by renters or average cash rentals which owners expressed themselves as willing to accept. It also recorded taxes, but submerged these in "indirect cash costs." A suitable cash rental figure consists of a sum paid or chargeable as rent and a sum chargeable as taxes. To reach a suitable figure it has been necessary to estimate what sums per acre were taxes in the Tariff Commission's "indirect cash costs," and to add the estimates thus reached to the Commission's net cash rental figures. The resulting sums are regarded as fair approximations of land charges per acre of wheat in each area during 1923. Further adjustment has been necessary to reach charges for rent and taxes applicable to the period 1921–24.

Adjustments and computations lead to estimates of yearly taxes per acre of wheat ranging as follows: 75 cents in Minnesota, 65 cents in Manitoba and Alberta, 55 cents in Saskatchewan, North Dakota, and South Dakota, and 35 cents in Montana. These estimates need not be defended in detail. They have the certain merit of not being too low for any area. They reflect the tendency of taxes to run higher in old communities than in new. They accord with the tendency for taxes to be high in areas where summer fallowing is a common practice. They do not make costs in Canadian areas unduly high as compared with American costs. Finally, they distinguish between taxes on wheat land and taxes on all agricultural land.

Net cash rentals excluding taxes are estimated for each area in the average year of the pre-war period as follows: Alberta, $4.45; Saskatchewan, $3.80; Minnesota, $3.40; Manitoba, $3.30; South Dakota, $2.25; North Dakota, $2.00; and Montana, $1.75. These estimates are defensible in the same manner as the estimates of taxes. On adding tax costs and net cash rentals, we reach average yearly land charges per acre of $5.10 in Alberta, $4.35 in Saskatchewan, $4.15 in Minnesota, $3.95 in Manitoba, $2.80 in South Dakota, $2.55 in North Dakota, and $2.10 in Montana.

These estimates show land charges per acre of wheat to have been considerably higher in Canadian areas than in American. This finding is of considerable importance, and it is not commonly accepted.[1] Yet the estimates are sounder than most; for comparisons of land charges in Canada and in the United States have commonly been based upon comparisons of general land values,—not of wheat land values, nor of cash rentals for wheat land. Other comparisons have also ignored the extremely important fact that extensive practice of summer fallowing necessarily increases land charges for wheat production. Yet whoever chooses to examine the Tariff Commission's statistics cannot escape the conclusion that land charges per acre of wheat in Canadian areas have exceeded those in most American spring-wheat areas during recent years.

[1] See the report of the late Secretary of Agriculture on "The Wheat Situation," *Agriculture Yearbook, 1923*, p. 114, among other articles.

Post-War Costs Including and Excluding Land Charges

Table 4 arrays average yearly post-war costs per bushel and per acre, including and excluding land charges.

The effect of including land charges in costs per bushel is in the first place to reduce the range between areas of costs per bushel. Thus per-bushel costs excluding land charges varied from 82 cents to 98 cents, a maximum difference of 16 cents; but per-bushel costs including land charges ranged from $1.08 to $1.20, a maximum difference of 12 cents. This tendency of per bushel costs in various areas to approach the same figure when land charges are included in costs is to be expected in the light of economic theory.

Table 4.—Average Yearly Post-War Costs of Producing Wheat Per Bushel and Per Acre, Including and Excluding Land Charges, in the Spring-Wheat Belt

Area	Basis: Cost per bu. including land charges	Cost per bu. excluding land charges	Land charges per bu.	Yield per acre	Cost per acre including land charges	Cost per acre excluding land charges	Land charges per acre
	$	$	$	bu.	$	$	$
Saskatchewan	1.08	.815	.26	16.4	17.72	13.37	4.35
South Dakota	1.09	.854	.24	11.8	12.88	10.08	2.80
Montana	1.13	.981	.15	14.5	16.32	14.22	2.10
Minnesota	1.15	.868	.29	14.5	16.74	12.59	4.15
Manitoba	1.16	.892	.27	14.9	17.24	13.29	3.95
Alberta	1.20	.864	.34	15.2	18.23	13.13	5.10
North Dakota	1.20	.977	.22	11.4	13.69	11.14	2.55

Under free competition and mobility of capital and over long periods of time, costs per bushel of production including land charges and charges for transportation from local elevators to central markets will tend to become equal in all areas. This is true because land charges will operate to equalize differences in other costs: in an area where cultivation costs and transportation costs to central markets are high, land charges will be low; and where cultivation and transportation costs are low, land charges will be high. The cost figures here employed take no account of transportation charges. But since these are not widely divergent between the areas, it may be said that land charges tend to iron out differences in farm costs per bushel.

That this tendency should ever equalize farm costs per bushel including land charges between areas is impossible so long as transportation costs differ. It must also be slow in its action and uncertain in its results under actual conditions so long as prices of produce and yield per acre are not predictable. Land charges as reflected in cash rentals are made by the renter's and the owner's compromise on normal net profits. This calculation depends primarily on estimates of normal yield, normal farm price, and normal margin between value of produce and cost excluding rent. It is at best a highly uncertain calculation, so that land charges on wheat in the spring-wheat belt can probably never be made with enough exactness to equalize precisely total costs per bushel calculated to include both land and transportation costs, still less farm costs per bushel not including transportation costs. But that costs per bushel including land and transportation charges tend to become equal in the long run is certain; and, in areas where differences in transportation costs are not great, farm costs per bushel including land charges will tend to become equal also.

In the second place, to include land charges in costs is to alter the rank of areas in costs per bushel, and in competitive ability, if costs per bushel be a serviceable index of competitive ability. Saskatchewan and South Dakota remain the areas where wheat could be produced most cheaply. But Montana, where post-war costs per bushel excluding land charges were highest, has costs per bushel including land charges which are third lowest. Alberta, with third lowest costs per bushel excluding land

charges, becomes the area where costs per bushel including land charges were highest.

But to determine what area was able during the post-war period to produce wheat most cheaply is far different from ascertaining what area has normally produced wheat most cheaply, or which area can be designated as the area most advantageously situated with regard to competition. It is quite impossible, when so many factors affect costs, to conclude that any given area can *consistently* produce wheat more cheaply than any other. If yield per acre should happen in 1925 to be considerably higher in Alberta than in Saskatchewan, it is perfectly possible that an array of 1921–25 farm costs per bushel including land charges would place Saskatchewan in third rank—or almost any other—rather than in first, and Alberta in fourth rank—or any other—rather than in seventh.

The fact is that consistent or permanent differences in farm costs per bushel including land charges are unlikely to exist, while temporary differences are always present. Prices, labor and materials requirements, yields, and land charges, are continually fluctuating both between areas and between years. They never in any given year attain such equilibrium that all areas are in that year of equal competitive ability. A long-time average of farm costs per bushel including land charges—say one of 25 years—might show all seven areas of the spring-wheat belt with about, but not precisely, the same average costs. The shorter the period to which averages apply, the more likelihood there is of wide divergencies in costs. In a sense, therefore, the measurement of competitive ability by comparisons of average farm costs between wide areas except when those costs are applicable to specific years, is futile, since differences must disappear as the periods to which costs are applicable are lengthened. To speak of permanent, semi-permanent, or normal differences in costs—when those costs are farm costs per bushel including land charges, the sort which, next to costs including transportation charges also, best reflects differences in competitive ability—is at best questionable. The conception that such "normal" differences exist becomes important when Canadian and American costs are discussed.

V. CANADIAN AND AMERICAN COSTS

We are now in a position to compare farm costs including land charges between the Canadian and American spring-wheat areas, each taken as a unit.

There is widespread impression that the farm cost per bushel of producing wheat is considerably lower in Canada than in the United States, *i. e.*, in the prairie provinces as compared with the American spring-wheat area. This opinion has been frequently expressed during the past two or three years. The late Secretary of Agriculture Wallace, in his report to the president on the wheat situation, phrased it as follows:[1] "While satisfactory comparisons between the cost of producing wheat in Canada and the United States cannot be made on the basis of available studies, it is quite apparent that the Canadian farmer has advantages which enable him to produce at *materially lower costs per bushel* than the American farmer."

Early in 1924, a few months after this opinion was expressed, the Tariff Commission conducted an elaborate investigation into comparative costs of wheat production in the United States and Canada, to which reference has already been made. The conclusions drawn from the investigation served to support the Secretary's conclusion and to strengthen the general conviction that Canadian farm costs are normally lower than American. The Tariff Commission found Canadian costs per bushel (including land charges calculated on a cash rental basis, but not transportation charges) to have been 52 cents lower than American costs in 1923, and 33 cents lower than American costs for the three years 1921–23.[2]

No contradiction of these conclusions has emanated from Canadian official sources.

[1] Submitted November 3, 1923; reprinted in *Agriculture Yearbook, 1923*, p. 115. Italics ours.

[2] U. S. Tariff Commission, *op. cit.*, p. 4.

On the contrary, Canadian official and public opinion holds with American that Canadian costs are materially lower than American as a normal thing. Thus, Mr. E. H. Godfrey of the Dominion Bureau of Statistics has recently stated: "The fact that the recent inquiries, both those of the United States and those of the Dominion Government, have demonstrated that the cost of grain production is less in Canada than it is in the United States is in itself of no little significance."[1]

The most important practical effect of such a belief is perhaps the feeling that a high tariff on Canadian wheat is necessary and proper in order to protect the interests of wheat producers in the United States. But it is more than possible that the conviction leads legislators and economists to emphasize the advantages possessed by Canada over the United States in wheat production, and hence to expect curtailment of wheat production in the Northwestern United States and its expansion in Canada more rapidly and extensively than would be probable if Canada appeared to be less advantageously situated.

A careful study of the data assembled and adjusted reveals important qualifications of the impression that farm costs of production are materially lower in Canada than in the United States. These are considered in this section. The next section will deal with some fallacies and difficulties involved in basing the tariff on wheat upon differences in costs of production. No attempt will be made here to point out the consequences to economic thinking involved in formulating more exact impressions of the advantages enjoyed by Canada in the production of wheat.

Undoubtedly there is some basis for the usual conception. It is indisputable that labor rates and land values have in the past been lower in Canada than in the United States, while yields there have ordinarily been higher. Yet little thought has been given to the possibilities that lower labor rates and land values in Canada may be counterbalanced by the necessity of employing more labor and more land in wheat production. It has been also customary to overemphasize the difference in yield per acre between the two countries. Finally, there has been too great a tendency to regard temporary differences in costs per bushel as normal or semi-permanent or permanent.

Under conditions which have prevailed since 1920, it is certain that lower labor rates and land values in Canada have been more than counterbalanced by higher labor and land requirements. This is true because more than 40 per cent of the spring-wheat crop of Canada is grown on fallowed land, whereas, on a liberal estimate, not more than 10 per cent is so produced in the United States.

Effect of Fallowing

The effect of extensive summer fallowing is to increase both labor and land charges per acre. The fallowed land must be cultivated while it lies idle; and cultivation is an expense. The crop of wheat grown on fallowed land must be charged not with one year's rent, but with two. Thus, if the annual cash rental is $1.00 in an area where 40 per cent of the wheat crop is grown on fallow, the land charge per acre of wheat is not $1.00, but $1.40. In another area where the annual cash rental charge per acre is $1.20 and 10 per cent of the wheat crop is grown on fallow, the land charge per acre of wheat is not $1.20, but $1.32. The same reasoning applies to labor costs. The primary difference between labor rates in the two areas and between land values must be large if it is not to be quite counterbalanced by differences in labor and in land requirements; and, as between Canada and the United States, the primary differences have not been in the past few years sufficiently great. Costs per acre have been in fact higher in Canada than in the United States in spite of lower labor rates and lower annual land charges in Canada.

Effect of Yield

The difference has been accentuated by higher yields. We have already indicated that higher yields do not result simply in

[1] "Costs of Grain Production," *Journal of the Canadian Bankers' Association*, April 1925, XXXIII, 305.

lowering per-bushel costs, but also, in a sense, in raising them by raising that part of per-acre cost which comprises threshing and marketing operations. This complication makes appropriate illustration of the effect of fluctuating yields on per-bushel costs a difficult matter, although fluctuating yield is the normal thing and must be reckoned with.

Let us assume that in a given area, A, where fallowing is not practiced, yield is 12 bushels, and the cost per acre is $12.00. In another area, B, where fallowing is extensively practiced, yield is 15 bushels, cost is $15.00. Then cost per bushel will be $1.00 in each area. (In general an area where summer fallowing is extensively practiced will be an area of high yield but also of high cost per acre; consequently the illustrative figures approximate facts.) Suppose, now, that in the next year the yield in area A rises to 13 bushels, while that in B falls to 14 bushels. Cost per acre will rise slightly in area A, say 20 cents and it will fall slightly in area B, say the same amount. Then cost per bushel in area A will be $12.20 ÷ 13, or 94 cents, and in area B it will be $14.80 ÷ 14, or $1.06. The cost per bushel will thus be higher in the area where yield was higher.

Summer fallowing is in fact extensively practiced in Canada, but not in the United States; yield per acre is ordinarily—not invariably—higher in Canada than in the United States. But when the Canadian yield falls below the American—as was true in 1924—Canadian costs per bushel inevitably rise above American; when the Canadian yield is only slightly above the American—a perfectly conceivable situation—Canadian costs per bushel are likely to exceed American; and only when Canadian yields are considerably above American will Canadian costs per bushel fall below American. Clearly more than the usual fact of higher yield in Canada must be considered in concluding that Canada can ordinarily produce at lower cost per bushel than can the United States. The degree to which Canadian yields are higher must also be considered.

To overemphasize the effect of yield on per-bushel cost is easy, while to measure the effect exactly is difficult, if not impossible. It has been customary in discussion of Canadian and American costs to focus attention simply on the fact of higher yield in Canada as a general thing, and to ignore the possibility that costs per bushel in Canada may conceivably be higher than American costs even when yield in Canada is higher. *No one knows precisely how much higher Canadian yields must be above American in order that Canadian costs may be lower.* So long as we lack this knowledge no one is justified in assuming that Canadian costs are materially lower than American ordinarily, normally, permanently, or semi-permanently.

Beyond a doubt Canadian farm costs per bushel including land charges were lower than American in 1923; for in that year the average Canadian yield[1] was 21.7 bushels, while the average American yield was 9.6 bushels. The Tariff Commission fixed the precise difference at 52 cents. Beyond a doubt the opposite was true in 1924: American costs were lower than Canadian; for the American yield was 16.3 bushels, the Canadian only 11.2. What the precise difference was in costs per bushel is not known. In 1921 the Canadian yield exceeded the American by 3.2 bushels, in 1922 by 3.7 bushels. Whether Canadian costs per bushel exceeded American or not in those years is not determinable, because this moderate advantage in yield may or may not suffice to push Canadian costs below American.[2] A five-bushel advantage certainly will; a one-bushel advantage certainly will not. When the Canadian advantage in yield ranges between two and four bushels, only an actual investigation can determine where costs per bushel are lower. If in the past four years Canadian costs have exceeded American once and have fallen below American once, while what relation existed in two other years is unknown, it is manifestly an error to assume that any constant relationship exists between Canadian and

[1] The figures of yield apply to the prairie provinces of Canada and the states of Minnesota, the Dakotas, and Montana. See Appendix Table VI.

[2] For the period 1921–24, Canada had the advantage of 3.4 bushels per acre in yield on the average, but an advantage of only $.04 per bushel in farm costs, including land charges. See Table 5.

American farm costs. To compare Canadian and American yields before 1921 will not serve to throw light on the problem, for yield alone does not determine cost per bushel, and other factors influencing cost in the years before 1921 cannot be traced satisfactorily.

Comparison of Average Costs

Table 5 compares average yearly farm costs per acre and per bushel of producing wheat in Canada and the United States, 1921–24, when the influence of summer fallowing as well as of yield is given proper weight. It appears that the Canadian farmer has, in the four-year period, been able to produce wheat at a cost per pushel *only slightly* lower than the American farmer, not at a cost *materially lower*. The figure applies to a four-year period only. If in 1925 Canadian yields are high, American low, then the difference for the period 1921–25 will be more marked. If in 1925 American yields exceed Canadian, the cost per bushel for the five-year period will be lower in the United States than in Canada. What relative yields will be in years to come no one can say. Conclusions as to normal differences between Canadian and American costs per bushel, if made in 1926 or 1927 or 1928, will depend upon what yield has been in preceding years. Yield is notoriously uncertain; consequently differences in costs per bushel are uncertain. Under actual conditions, the assumption that the Canadian farmer "has advantages which enable him to produce at materially lower costs per bushel than the American farmer," is unsound so far as it implies normal or long-time advantages or applies to farm costs. It was sound in November 1923, for either the year 1923 or the period 1921–23, simply because the Canadian yield in 1923 exceeded the American by the great amount of 11.3 bushels. It was unsound for 1924 and for the period 1921–24. It may or may not be unsound for the period 1921–31, or for the period 1910–21. The advantage in farm cost per bushel may lie with Canada in one year, with the United States in the next; this we know. We do not know how often it has lain or is likely to lie with Canada, or how great the advantage has been or is likely to be in any given year. Only by overemphasizing differences between the two countries in yield per acre, land values, and labor rates, and by neglecting the effect of summer fallowing, is it possible to conclude that Canadian farmers normally have a considerable advantage over American farmers in spring-wheat production.

Table 5.—Average Yearly Post-War American and Canadian Farm Costs per Bushel, Including Land Charges, of Producing Wheat in the Spring-Wheat Belt.

Area	Costs per acre [a] $	Costs per bushel [b] $	Yield per acre [c] bu.
United States	14.40	1.16	12.4
Canada	17.78	1.12	15.8

[a] Averages of costs per acre in separate areas as shown in Table 4 weighted by average post-war acreages in all wheat as shown in Appendix Table V.

[b] Averages of costs per bushel in separate areas as shown in Table 4 weighted by average post-war production of all wheat as shown in Appendix Table III.

[c] All wheat. See Appendix Table VI.

VI. THE COST-OF-PRODUCTION FORMULA AND THE TARIFF ON WHEAT

The Republican party at present endorses, as the most equitable and proper method of determining rates for a protective tariff, the cost-of-production formula. Tariff rates are to be determined by ascertaining the difference between costs of production per unit in the United States and in the principal competing countries, and by fixing the rate at the precise amount of difference in costs. It is the purpose of the present section to examine some difficulties and inconsistencies involved in applying the cost-of-production formula to the tariff on wheat. To discuss the general soundness of basing a tariff upon differences in cost of production,[1] or the general desirability of a protective tariff whether on wheat or other

[1] Details regarding the general purposes of protection, discussion of costs of production as a basis for tariff-making, and existing provisions in tariff acts now in force are to be found in T. W. Page's *Making the Tariff in the United States*, McGraw-Hill, New York, 1924.

commodities, or the economic effects of past and present tariffs on wheat, is not within the scope of the present inquiry.

Procedure in Fixing Present Duty

The Tariff Act of 1922 fixed the tariff on wheat at 30 cents per bushel; but in the so-called "flexible provision" Congress directed the President to proclaim changes in the duty (on wheat or other commodities) when, after investigation, the existing duty was found not sufficient to "equalize differences in cost of production in the United States and the principal foreign countries." The Tariff Commission is directed to "assist the President in ascertaining differences in costs of production," and no change in duty may be made by proclamation until investigation has been made. Regardless of the findings of the Commission, however, the Act restricts total increases or decreases in duties by the President to 50 per cent of the rates specified in the Act.[1] Thus, under the Act of 1922, the duty on wheat may not fall below 15 cents per bushel or exceed 45 cents per bushel. How frequently the President shall alter rates is not specified by the law.

On March 7, 1924, the President by proclamation raised the duty on wheat from 30 to 42 cents per bushel, on the ground that differences in costs of production between Canada, the principal competing country, and the United States amounted to 42 cents, as had been determined after adequate investigation by the Tariff Commission. The 42-cent duty is still in effect.

This figure was not reached without serious disagreement among members of the Tariff Commission. Three commissioners argued that the difference between Canadian and American costs in 1923 alone should be employed in computing the tariff; that "costs of production" should not be construed to include costs of transportation from local elevators to central markets; and that "bulk-line" costs, not weighted average costs, should be compared. On these principles the difference in costs of production amounted to 70 cents; and the three commissioners recommended a duty of 45 cents, the highest permissible under the 50 per cent increase over 30 cents per bushel allowed by the Act of 1922. The other three commissioners argued that average 1921–23 costs should be employed in computing the tariff; that costs of transportation should be included in total costs; and that weighted average costs, not bulk-line costs, should be compared. These three commissioners found the difference between Canadian and American costs to be 42 cents, and recommended a duty of that amount.

This recommendation was accepted by the President. In accepting it he stamped official approval on the measurement of differences in costs by reference to a period of years, on the inclusion of transportation charges in costs, and on the use of the weighted arithmetic average rather than the bulk-line. But not all of these principles are sound for the fixing of a duty on wheat, nor do they achieve the aim sought by the cost-of-production formula.

If the purpose of the protective tariff is primarily to equalize competitive conditions in wheat production in Canada and the United States, then costs of transportation to central American markets must be included as or with costs of production. Competition takes place in wholesale markets, not on the farms. Wholesale market prices must cover transportation charges as well as farm costs if wheat production is to be profitable. It is by affecting wholesale prices that the tariff is supposed to equalize competitive advantages. On this general theory there was, in fact, no real disagreement between members of the Tariff Commission. The exclusion of transportation charges from costs of production by three members was based on the contention that Congress had not specifically or by implication authorized their inclusion in the Act of 1922. "If," wrote these three, "the Courts should construe the statute [as not including transportation costs], a proclamation based on their inclusion would utterly fail. . . . No one disputes that transportation costs are a factor in competition."[2] They further contended that "the natural and ordinary meaning of the words 'costs of production' does not include costs of trans-

[1] Proviso to Section 315 (a).
[2] *Wheat and Wheat Products*, p. 34.

portation." The contention would doubtless not have been raised had the Tariff Act specifically required the inclusion of transportation charges as costs. The action of the President in approving their inclusion is scarcely open to criticism on theoretical grounds, though it may be on the ground of legality.

Period Averages or Yearly Averages?

Congress, in fixing the duty on wheat at 30 cents, three members of the Tariff Commission, in employing a 1921–23 average of costs which lead to a figure of 42 cents, and the Administration, in approving the 42-cent figure, all apparently assumed that a semi-permanent or normal difference exists between Canadian and American farm costs of wheat production. We have shown that no such semi-permanent difference is demonstrable on the basis of available data; it can be assumed only by ignoring the effect of summer fallowing, by overemphasizing lower land values and labor rates in Canada, and by overemphasizing differences between Canadian and American yield per acre. Canadian costs, excluding transportation charges, would have been found only about *4 cents* per bushel lower on the average for the four-year period, 1921–24, or about *12 cents* lower when transportation charges are included; not *33 cents* (excluding transportation) nor *42 cents* (including transportation) as was found by the Tariff Commission for the period 1921–23. A low yield in Canada and a high one in the United States in 1925 might readily suffice to bring Canadian costs, excluding or even including transportation charges, for the period 1921–25 above the American costs. A high yield in Canada and a low yield in the United States would have the opposite effect.

A neat dilemma presents itself if tariff rates are to be based upon differences in average costs over a period of years rather than on differences in costs in specific years. In the long run, costs per bushel of producing wheat including land charges and transportation costs from local elevators to central markets, must tend to become almost equal in any two areas,[1] though lack of mobility of capital and imperfect adjustment of land charges will doubtless never allow complete equalization. Land charges will eventually increase in the area where other costs are lower. It may happen that the difference between average American and Canadian costs per bushel including land rent, but excluding transportation costs, over the period 1924–44 will be very low. For short periods the difference between the two types of costs may be at one time considerably in favor of Canada, at another time in favor of the United States.

To base the tariff on long-time differences in costs per bushel including land rent and transportation charges, will thus eventually result in a tariff rate of next to nothing. To base the tariff on long-time differences in costs including land rent but not costs of transportation, will result in a rate not far from the difference between the two countries in costs of transportation.[2] A 1921–23 average showed a net difference between costs not including transportation of 33 cents. A 1921–24 average shows a net difference in similar costs of 4 cents. A 1921–28 average may conceivably show a net difference of 2 cents. Meanwhile, in any particular year, Canadian costs may be lower than American by 52 cents. In such a year American producers will inevitably demand high protection. They will obtain it under the cost-of-production formula only if the Executive excludes land rent as an element in cost of production, or abandons the practice of obtaining averages applicable to a period of years. To base the tariff on differences between long-time averages of costs including land rent will appeal to free-traders because it must result in something approximating free trade; but it will not appeal to protectionists.

In order to fulfill the purpose underlying the cost-of-production formula as applied to wheat, differences between American and Canadian costs would have to be determined every year by the "survey method," and the duty revised to accord with yearly differences. What moderate protectionists desire, as distinguished from those who

[1] See above, p. 183.

[2] The difference between the two countries in transportation to Buffalo was less than 10 cents per bushel. U. S. Tariff Commission, *op. cit.*, p. 13.

seek a prohibitive tariff, is equal competitive ability at any given immediate time.[1]

But to ascertain costs every year involves some serious practical difficulties. It involves abandonment of restricting the Tariff Commission to a 50 per cent increase or decrease in tariff rates; for in one year the Canadian costs may be lower than American by 52 cents, while in another year they may be actually higher than American. It involves considerable expense. Moreover, there is some doubt whether or not differences in costs could be ascertained with sufficient rapidity. New tariff rates ought to become effective at the moment when American and Canadian wheats begin to compete in American markets. A cost inquiry involves interviews with some 2,000 farmers, transmission and tabulation of records, compilation of findings, agreement among members of the Commission, and proclamation by the President. Inquiry cannot begin until much of the Canadian crop has been harvested. The new rate could scarcely become operative until a considerable amount of wheat had come into competition.

The only practicable method of ascertaining differences in costs promptly and inexpensively appears to be to calculate them by some mathematical method. If prices of materials, labor, and land were known to be much the same in any two years, and costs had been determined in the first, it might be possible to calculate costs in the second year with some accuracy. Costs per acre would be much the same except as different yields in the two years caused differences. If basic information on the effect of yield on per-acre costs could be obtained, then per-acre costs could be calculated, and per-bushel costs could be calculated from them by the usual method. Such a device would not result in prompt changes of rates unless statistics of yield were available promptly. On the whole, such a method is not greatly to be recommended. It would be open to criticism on the ground of inexactness—though no more so in fact than the method now in use. Surveys would at best be required frequently, since labor rates, materials, prices, labor and materials requirements, and land charges are unlikely to remain stable over a period of several years.

Who Shall Be Protected?

There is, however, a more important objection to basing the wheat duty on yearly determinations of difference in costs. Shall all American producers be protected, or what proportion of them? It is a well established fact that costs of production vary widely between individual producers in a given year. What kind of averages ought to be compared is therefore a question of vital importance. Averages of individual costs may be reached in different ways; by the use of the median, the mode, the simple arithmetic average, the weighted arithmetic average, the bulk-line method. In practice, the merits of the last two only have been extensively debated.

The use of the weighted average may result in inadequate protection for as high as 35 per cent of the producers,[2] since variations in individual costs are so extensive —a result probably not contemplated by ardent protectionists, certainly not by the 35 per cent of producers, who are themselves quite likely to constitute the element most earnestly seeking protection. The use of the bulk-line method may result in inadequate protection for anywhere from 1 to 49 per cent of producers. Under actual cost conditions, the weighted average is unlikely to run above the costs of more than 75 per cent of the total number of producers; so that 25 per cent are likely to receive inadequate protection if the tariff is based on comparisons of weighted averages. But can these 25 per cent be defined

[1] The "survey method" of obtaining cost data, whereby field agents visit individual farmers, seems necessary in order to eliminate any tendency toward bias. It cannot be supposed that Canadian farmers, knowing that low costs in Canada would raise the American tariff, would not "pad" their costs if that were possible. This is said, probably with truth, to be impossible when field men are able to check one answer of a farmer with another. But a cost questionnaire, which must necessarily be simple and easily tampered with, could not be employed in foreign countries once farmers were aware that the American tariff could be kept down by reporting high costs.

[2] The weighted average of American 1921–23 costs was above the costs of 65 per cent of American producers; the weighted average of 1923 costs was above the costs of 67 per cent of producers.

as abnormally high-cost producers, and hence not deserving of adequate protection? No one denies that a certain percentage of inefficient producers exists, but no one knows how large that percentage is in any given year. Those who advocate the weighted average method obviously lean toward the notion that anywhere from 25 to 35 per cent of wheat producers are inefficient and undeserving of complete protection.

The bulk-line method provides a means for protecting a larger proportion of producers. The Tariff Commissioners who advocated the method chose 85 per cent as the point where differences in cost should be measured; but they might equally well have chosen 70 per cent or 90 per cent. The bulk-line method is at best arbitrary. Its results depend upon the definition of "bulk of production." Bulk of production was defined by three commissioners as "simply the whole production less that part of it which is produced at abnormally high costs." If "abnormally high costs" could be defined mathematically, the bulk-line method would seem satisfactory. But the cost curve has a gradual slope, not an abrupt one; and abnormally high-cost producers cannot be selected except arbitrarily.

Obviously the question of what proportion of producers deserve protection needs to be settled before even yearly determination of differences in costs will serve to fulfill the ideal of equalizing competitive opportunities, which lies behind the cost-of-production formula. The proportion of inefficient and undeserving producers must be ascertained. At present no such classification is possible.

It is of interest to observe that the duty on wheat is likely in practice in the next few years[1] to move only upward under existing provisions of the law. An investigation of costs followed by a proclamation is likely to come only at the instigation of producers seeking additional protection in a year when Canadian yields—and hence costs—are low, while American yields and costs are high. Consumers' interests are not as yet so highly organized as to petition for reduction, force a hearing before the Tariff Commission, and compel a downward revision. It is certain that American costs for 1924 were lower than Canadian; but demands for a reduction of the 42-cent duty were not and are not heard. The tariff remains almost prohibitive, in a year when protection to the American farmer is clearly unwarranted by the cost-of-production formula. So far as one can see at present, the possibility of a reduction is remote, while that of an increase is easily conceivable in any of the next few years when Canadian yields are good but American yields poor. Under the existing law, however, the increase could not exceed 3 cents per bushel, since a 45-cent duty is the highest permitted under the flexible-tariff provision.

The conclusion is that the cost-of-production formula as applied to wheat is neither scientific nor capable of achieving the end sought by its advocates. In the long run it will fail to give protection when protection is wanted, if long-time averages continue to be used. If this difficulty is avoided by employing yearly averages and broadening the restrictions of the flexible-tariff provision, a method must be found to distinguish inefficient producers from efficient. If such a method cannot be developed, the application of the cost-of-production formula to the wheat duty will remain unscientific.

VII. BROAD CHANGES IN THE LEVEL OF COSTS

In an earlier section attention has been directed toward changes in cost levels since the pre-war period in the various political subdivisions of the spring-wheat belt. Here we may consider these changes more broadly, with reference to the belt as a whole.

Orthodox economic theory attaches great importance to the influence of cost of production upon price. In the long run, prices of commodities like wheat, produced under competitive conditions and at varying costs,

[1] In the long run, if long-time averages were employed, differences in costs would diminish and the tariff rate would fall. See p. 189.

are said to be determined by the marginal cost of production or by the cost of production of the most expensive increments of the supply.[1] Costs of production—or expenses of production, the term used in orthodox theory—include not only labor and materials charges, but expenses of management and interest at normal rates on invested capital as well. They do not, however, include true land rent, which is regarded as a result of prices rather than as a factor determining price.

In order to determine whether or not there have been between the pre-war and post-war periods changes in the costs of wheat production which must affect prices in the long run, we should require first of all cost figures for marginal producers in each period, these figures compiled to include labor, materials, interest, and management costs. Since wheat prices are at least partially determined by world conditions, the marginal producer must be sought in many countries. He cannot, of course, be located; and if he could be, his costs could not be calculated to include interest or management charges; for under actual conditions investment in capital cannot be separated from investment in land, and there exists no criterion for a reasonable charge for management. There is, therefore, no possibility of testing by statistical methods the adequacy of orthodox economic cost-and-price relation theories.

The cost statistics applicable to both the pre-war and post-war periods employed in the present paper apply only to the spring-wheat belt of North America, do not include charges for taxes or for wages of management, and are average costs of all producers rather than marginal costs. But there is, perhaps, enough connection between theoretical marginal costs and imperfect, weighted-average costs to justify consideration of changes in the level of average costs between periods. If the level of average costs has changed radically, it is conceivable that the level of marginal costs has changed as well and that a permanent influence on prices has been exerted.

[1] Taussig, *Principles of Economics*, II, 55. That the "most expensive portion of the supply of most agricultural products regulates the long-run value of the whole supply"—the price—is doubtful. If in any given year or series of years many producers, perhaps as high as 10 per cent, continue to produce while receiving less than "normal" returns on capital, labor, and management, then a considerable amount of product is offered continually at less than marginal cost. Orthodox economic doctrine gives too little consideration to extra-marginal producers in agriculture, though such producers are always present to greater or less degree under dynamic social conditions.

Measurement of Increases

Table 6 shows percentage increases in the costs per bushel, excluding land charges, of producing wheat in the spring-wheat belt between the pre-war and post-war periods. In the spring-wheat belt as a whole, per-bushel costs increased 52 per cent. This increase can have been due either to increases in prices of labor and materials, or to increases in quantitative requirements of labor and materials, or to decreases in average yields per acre. Yield per acre decreased only slightly — two-tenths of a bushel per acre—between the two periods; hence its influence in increasing per-bushel cost can have been but slight. There is no statistical method of measuring the effect on per-bushel costs of increases or decreases in quantitative requirements. The effect of increases in prices is measurable, if at all, by reference to index numbers of wholesale prices, with prices of the years 1908–14 taken as 100.

Table 6.—Percentage Increases in Yearly Average Costs Per Bushel, Excluding Land Charges, of Producing Wheat in Canada, the United States, and the Spring-Wheat Belt as a Whole, Between the Pre-War and Post-War Periods.

Area	Pre-war cost per bushel *a*	Post-war cost per bushel *a*	Per cent increase	Pre-war yield per acre *b*	Post-war yield per acre *b*
	$	*$*	*%*	*bu.*	*bu.*
United States	.608	.945	55	12.2	12.4
Canada	.545	.837	54	18.5	15.8
Belt	.579	.878	52	14.4	14.2

a Costs in sub-areas as shown in Tables 1 and 3, weighted by production in each area as shown in Appendix Table III.
b See Appendix Table VI.

The two series of index numbers of wholesale prices which can be calculated on a 1908–14 base are those of the American Bureau of Labor Statistics currently pub-

lished on a 1913 base,[1] and those of the Canadian Department of Labour (old series) published on an 1890–99 base.[2] The American series recalculated on a 1908–14 base shows the American price level of 1921–24 to have averaged 153.5; the Canadian series similarly adjusted shows the Canadian 1921–24 price level to have averaged 178.4. Hence the cost per bushel of wheat in the spring-wheat belt as a whole appears not to have risen between the pre-war and post-war periods so high as the general wholesale price level: costs of wheat production rose only 52 per cent, while wholesale prices rose 53.5 per cent in the United States, 78.4 per cent in Canada. Thus it would seem possible to conclude that the average level of *real* costs of wheat production has declined between the two periods. If this is true, and if the long-run price of wheat is determined by its cost of production, one might infer that the normal post-war price of wheat will not be so much above the pre-war average as seems true of commodities in general.

Qualifications Necessary

Such a conclusion cannot be regarded as definitive. In the first place, costs per bushel are necessarily affected by yield per acre. The average yield per acre in the spring-wheat belt for such a period as 1921–27 may exceed or fall below the average yield for the period 1921–24. If the yield in the next few years exceeds the 1921–24 average even by one bushel per acre, it will be possible to conclude—for that period at least—that the level of real costs has declined. But if the average yield in the next few years falls below that of 1921–24, we may conclude that the real cost level has risen. An opinion about the possibility that a real and permanent decline in the cost of wheat production in the spring-wheat belt has occurred, must be based on the notion that 14.2 bushels per acre is the normal long-time average yield in the belt. No one, of course, knows whether 14.2 bushels per acre is or is not the normal long-time yield. Hence it is possible to conclude only that, as between a period including the years 1908–14 and another period 1921–24, the level of average costs of wheat production did in fact decline somewhat. It is not possible to conclude that the decline was of a permanent nature capable of affecting the future price level, even if average costs were marginal costs and costs in the spring-wheat belt were costs throughout the world. There is no evidence to support the conclusion that in the spring-wheat belt as a whole sufficient progress has been made through the introduction of new machinery, new methods, and new varieties of wheat, decisively to overbalance rising prices, soil exhaustion, plant diseases, and increased practice of summer fallowing in their effect upon costs of production. If real costs between the two periods have declined, they have not only declined slightly, but they may not have declined permanently. The inclusion of another year in the post-war period might change the decline into an increase.

Furthermore, the index numbers chosen, at least the Canadian, are by no means clearly suitable for comparison with farm costs of production. Index numbers are made up from the wholesale prices of many commodities, while farm costs contain the prices of comparatively few; and the composition and weighting processes used in index numbers are still matters of dispute. Again, one may err greatly in assuming that marginal costs of production vary with average costs. Since no one has as yet been able to locate the marginal cost, its relation to the average cost is uncertain. Finally, what has happened to the real cost level in the winter-wheat belt of the United States or in the wheat areas of Argentina, Australia, India, and Europe is not known. Yet costs in these areas have perhaps as important a bearing on price as have costs in the spring-wheat belt.

The foregoing discussion does, however, suggest the possibility of a reduction in real costs per bushel in producing wheat, and it tends to discredit the common assumption that there is an unchanging normal relationship between the price of wheat and the general level of prices, upon which the advocates of a "ratio price" for wheat seek to found their case.

[1] In the *Monthly Labor Review.*
[2] In the *Labour Gazette.*

VIII. COSTS IN RELATION TO FARM PROSPERITY

Farm cost-of-production statistics are perhaps more generally employed for the diagnosis and measurement of farm prosperity than for any other purpose. For such diagnosis profits must be calculated, and their calculation involves the use of price statistics. It is the purpose of the present section to point out some limitations on the use of profit statistics per acre of wheat as an index of farm prosperity in the spring-wheat belt. Table 7 arrays yearly maximum and net profits per acre[1] of wheat during the pre-war and post-war periods so far as both are calculable, together with the factors—cost, yield, and price—chiefly influencing profits.

period, while farmers in Minnesota received $.91, or 33 per cent more. In the post-war period Minnesota farmers received $1.069 per bushel as against $.848 in Alberta; but the percentage difference was reduced from 33 per cent to 26 per cent. The rank of the various areas in farm price ran much the same in both periods—Minnesota, North Dakota, South Dakota, Montana, Manitoba, Saskatchewan, and Alberta in the pre-war period, with Montana and South Dakota changing places in the post-war period; and in both periods Canadian prices were lower than American.

Distance from central markets, quality of grain, and tariff protection account for the

TABLE 7.—AVERAGE YEARLY PRE-WAR AND POST-WAR MAXIMUM AND NET PROFITS PER ACRE FROM PRODUCING WHEAT IN THE SPRING-WHEAT BELT, BY AREAS

Period and area	Cost per acre excluding land charges *a*	Cost per acre including land charges *a*	Yield per acre *a*	Farm price per bushel *b*	Value of produce per acre *c*	Basis: Maximum profits per acre *d*	Net profits or loss per acre *e*
	$	$	bu.	$	$	$	$
PRE-WAR							
Montana	10.23	—	24.8	.801	19.91	9.68	—
Manitoba	8.96	—	17.8	.794	13.90	4.94	—
Minnesota	7.95	—	14.0	.910	12.64	4.69	—
Alberta	10.72	—	21.1	.683	14.41	3.69	—
South Dakota	6.65	—	10.9	.856	9.24	2.59	—
North Dakota	7.36	—	11.1	.877	9.60	2.24	—
Saskatchewan	10.63	—	18.3	.711	12.85	2.22	—
POST-WAR							
Minnesota	12.59	16.74	14.5	1.069	15.99	3.40	– .75
South Dakota	10.08	12.88	11.8	.961	11.57	1.49	–1.31
Manitoba	13.29	17.24	14.9	.913	13.85	.56	–3.39
North Dakota	11.14	13.69	11.4	.983	11.52	.38	–2.17
Montana	14.22	16.32	14.5	.980	14.34	.12	–1.98
Saskatchewan	13.37	17.72	16.4	.868	13.48	.11	–4.24
Alberta	13.13	18.23	15.2	.848	12.03	–1.10	–6.20

a From Tables 1, 3, and 4. *b* From Appendix Table VII.
c Calculated by averaging yearly values of produce computed from Appendix Tables VI and VII.
d Differences of figures in columns 1 and 5. *e* Differences of figures in columns 2 and 5.

Farm prices[2] exhibit a surprising range between areas in the same period. Farmers in Alberta received, on the average, only $.683 per bushel for wheat in the pre-war

differences of farm prices between areas; but detailed explanation is impracticable here. The tariff has been effective in some years, but not in others. Quality is good in some areas but not in others in the same year. Quality has become of increasing importance with the growing practice of millers in buying wheat on the protein-content basis. Durum wheat has become of larger importance, and winter wheats of

[1] Maximum profits are profits calculated without reference to land charges; net profits include land charges. Profits per bushel need no consideration. They must show the same facts, though in smaller figures, as profits per acre.

[2] See Appendix Table VII for methods of calculating farm prices.

less. Transportation facilities and expenses have changed. These developments require intensive analysis if their relative effect on farm prices in various areas of the spring-wheat belt is to be ascertained. It suffices for present purposes merely to indicate that farm prices have differed, for the most part consistently, in the different areas; and that the extent of the differences has been somewhat reduced between post-war and pre-war times.

Maximum Profits Per Acre

Maximum profits per acre have clearly varied considerably between areas in the same period. This variation also characterizes net losses in the post-war period—a result scarcely to be expected if land charges as reflected in cash rentals are accurately made on the basis of profits normally to be expected from the experience of past years. We should rather expect net profits or losses to vary less than maximum profits. The fact is that cash rentals are not under actual conditions based upon the expectations of normal profits so far as those can be ascertained, but often upon the hope, frequently not reasoned, of higher future prices and yields and upon a complex of psychological factors not amenable to measurement or even enumeration. What is true of cash rentals is also true of land values.

Clearly maximum profits per acre of wheat have not been higher in Canada than in the United States in either period. Net profits have not been higher in Canada nor net losses lower in the post-war period, though a contrary opinion is common. This opinion has been due in part to the notion that costs are normally lower in Canada, in part to the notion that Canadian farm prices are not much below American, and in part to higher yields in Canada. But, although Canada has in both periods had the advantage in yield per acre, she has not had the advantage either in farm price or in costs per acre.

There has been a general decrease in maximum profits per acre between the two periods, and presumably in net profits also. This decrease is the proximate cause of the recent agricultural depression in the northwestern states. The usual expression of the causes of the depression has been that sharp increases in costs of production have not been counterbalanced by corresponding increases in price. The expression is accurate for North and South Dakota and Minnesota, but not for Montana. In that state a decrease in yield was fully as important in affecting prosperity as was the failure of price increases to balance increases in costs. Nor is the expression of the same accuracy when applied to each of the states of North and South Dakota and Minnesota. Decreases in profits were not equally sharp in these areas, nor were increases in yield or in price equally great in each, although increases in costs were much the same.

Net Profits

Net profits per acre of wheat appear, at first glance, to provide as reliable a measure of farm prosperity in the spring-wheat belt as any that can be devised. Thus it seems proper to say, since farmers in Alberta in the post-war period sustained the highest loss per acre of wheat while farmers in Minnesota sustained the lowest, that farm prosperity was at its lowest ebb in Alberta, Saskatchewan, and Manitoba in the order named, but suffering was less acute in Minnesota, South Dakota, Montana, and North Dakota. What the range of net profits may have been in the pre-war period is not determinable for lack of data on land charges; consequently, which areas suffered the greatest reversal in prosperity between the two periods or which areas were most prosperous in the pre-war period cannot be determined. Presumably the general decline between periods of maximum profits per acre serves to establish the fact of less prosperous conditions in the post-war than in the pre-war period. But this fact is equally well attested by evidence of other less complex sorts—such as tax delinquency, bank failures, foreclosures of mortgages, and the like. From statistics of profits per acre of wheat no obviously satisfactory conclusions regarding farm prosperity in the spring-wheat belt can be drawn other than to indicate the relative prosperity of the differ-

ent areas in the post-war period. But even this indication is subject to qualification.

Relative Importance of Wheat-Growing

The first and most obvious limitation on the use of net profit per acre figures as a measure of farm prosperity is the fact that wheat was a less important source of income in some areas than in others. We may, on the basis of profit statistics, properly or improperly conclude that wheat production was least profitable in Alberta, most profitable in Minnesota, and profitable in other areas in accordance with the size of the net profit or loss figure. It might likewise be possible to demonstrate that wheat production was extremely profitable in Massachusetts; but wheat production has slight bearing on farm prosperity in Massachusetts. In the same way wheat production is and has been of different degrees of importance in the various areas of the spring-wheat belt.

In the pre-war period,[1] wheat production was of greatest importance in North Dakota, Manitoba, and Saskatchewan. In these areas 27 per cent, 25 per cent, and 19 per cent of all land in farms was planted to wheat. In Minnesota and South Dakota 14 per cent of all farm land was in wheat, and in Alberta and Montana 10 per cent and 3 per cent, respectively. In North Dakota, Manitoba, and Saskatchewan 60 per cent of the crop land was in wheat; but in Alberta the percentage was 49 per cent, in South Dakota 38 per cent, in Minnesota 33 per cent, and in Montana 23 per cent. Livestock provided a much more important source of income in Montana, South Dakota, and Minnesota than elsewhere, and was least important in Saskatchewan, Manitoba, and North Dakota. The number of animal units[2] per farm in 1910 and 1911 ran as follows: Montana, 36.4; South Dakota, 23.5; Minnesota, 17.6; Alberta, 13.3; North Dakota, 11.5; Manitoba, 10.8; and Saskatchewan, 7.5. Profits per acre of wheat were thus of distinctly secondary importance in Montana, where livestock was the chief source of income and where wheat occupied only 3 per cent of total farm acreage. It was of relatively slight importance in South Dakota, Minnesota, and Alberta, and of vital importance only in North Dakota, Manitoba, and Saskatchewan. Thus, even if net profits per acre of wheat were known for all areas in the pre-war period, we should be quite unjustified in assuming that farm prosperity in the various areas coincided with the size of the net profits per acre of wheat figures. The fact might be true of North Dakota, Manitoba, and Saskatchewan, and approaching the truth in Minnesota, South Dakota, and Alberta; but it would be quite untrue of Montana.

Between the two periods wheat production declined in relative importance in Minnesota, South Dakota, Manitoba, and North Dakota—considerably in the first two areas, slightly in the second two. In Minnesota land in wheat fell from 14 to 10 per cent of all land and from 33 to 21 per cent of crop land, and the number of animal units per farm rose from 17.6 to 19.7. In South Dakota similar developments took place, land in wheat falling to 8 per cent of all land and 26 per cent of crop land, while animal units per farm increased to 38.3. In Manitoba, however, 24 per cent of all land and 56 per cent of crop land remained in wheat, while animal units per farm increased only to 13.6; and in North Dakota 27 per cent of all land and 56 per cent of crop land remained in wheat, animal units per farm increasing to 19.1. In Montana, Saskatchewan, and Alberta wheat production increased in importance. The percentage of all land in wheat rose in the areas named from 3 to 8 per cent, 19 to 31 per cent, and 10 to 18 per cent; the percentage of crop land in wheat rose from 23 to 54, 61 to 62, and 49 to 55. Animal units per farm decreased from 36.4 to 27.7 in Montana, but increased from 7.5 to 11.5 in Saskatchewan and from 13.3 to 18.5 in Alberta.

It is, therefore, easy to exaggerate the

[1] The calculations and deductions in ensuing paragraphs are based partially on census data, partially on annual reports of statistical offices. It is assumed that the American census of 1910 and the Canadian census of 1911 represent pre-war distributions of acreage fairly well, while post-war distributions are represented by the censuses of 1920 and 1921. See Appendix Tables XII–XIII.

[2] One mature cow or steer, five hogs, or seven sheep equals one animal unit. Calculations are made without reference to maturity.

bearing of wheat production on farm prosperity in Minnesota, South Dakota, and Montana in the post-war period, and to measure farm prosperity in these areas by the size of net profits per acre of wheat is quite impossible. Doubtless profits on wheat affected farm prosperity; but profits on livestock must have been of far greater significance. In Manitoba, Saskatchewan, Alberta, and North Dakota wheat production was of more importance. But even in these areas some income came from livestock, and from 40 to 45 per cent of the crop land was devoted to other crops than wheat. An adequate measure of farm prosperity even in these four areas where wheat is the most important source of income requires statistics of profits on all types of farm produce, together with definite knowledge of the proportion of total income of the average farmer furnished by each type. Furthermore, ascertaining of profits on livestock is notoriously difficult; and the apportioning of total income to its various sources has never been attempted on an extensive scale, for large areas or for small ones. Hence, profits in wheat production even in Manitoba, Saskatchewan, and North Dakota provide only an uncertain and unsatisfactory measure of farm prosperity.

Rented Lands

A second limitation upon the use of profit statistics as a measure of farm prosperity is the fact that different conditions of tenure exist in different areas, and render the significance of land charges different in different areas. Land charges are of greater significance during a period of depression to the farmer who must pay them in cash than to the farmer who has no rent or mortgage charges to pay. If 50 per cent of the farmers in one area are renters, while only 5 per cent are renters in another area, land charges affect the prosperity of the first area more seriously than that of the second. Renters *must* receive a sufficient sum per acre to cover costs including land charges if they are to remain on farms; owners *prefer* to obtain such a sum, but are able to remain on their farms if such a sum is not forthcoming. Thus, in the post-war period, losses per acre were $4.24 in Saskatchewan, $2.17 in North Dakota, and the importance of wheat production was much the same in both areas. If net profits provided a measure of farm prosperity, we should conclude that farmers in Saskatchewan were less prosperous than farmers in North Dakota. But in North Dakota 26 per cent of all farmers were renters, and hence in a position to feel the $2.17 loss to the full; but only 11 per cent were renters and in a position to feel the $4.34 loss to the full in Saskatchewan.[1] The size of the net profit or net loss figure may often be less important than the number of farmers suffering losses; accordingly it is quite possible that in the post-war period prosperity was at a lower ebb in North Dakota than in Saskatchewan. Similar reversals of conclusions drawn from net profit figures are conceivable even if net profits were obtained on all types of farm produce. Conditions of tenure[2] are quite as important in their bearing on farm prosperity as are profits.

Unpaid Labor

A third qualification of the use of average profit figures to measure prosperity is the fact that unpaid labor—that of the operator and his family—is in cost statistics recorded as hired labor. This practice is open to little objection when costs alone are under consideration. But in one area perhaps 10 per cent of the labor on wheat must be hired, and so paid for in cash, while in another area 50 per cent must be hired. If so—though on this point practically no information is available—farmers in certain areas are more nearly in a position to feel the full weight of labor costs than farmers in other areas, and find their prosperity more insecure when values do not equal costs. If profit statistics are to be employed as a measure of prosperity, clearly

[1] See Appendix Table XI. Canadian figures are perhaps not satisfactory, since many Canadian farmers officially recorded as owners may have been practically in the status of renters on account of the sale of land for a small sum down and amortization payments over a term of years.

[2] The relative proportions of mortgage indebtedness in different areas is also of importance; but on this point satisfactory data for Canada are not available.

possible differences of practice in hiring labor must be ascertained.

State Areas Not Homogeneous

A final qualification applicable to the interpretation of profits in the spring-wheat belt is dictated by the use of state averages. Minnesota is not in fact an area marked out by special characteristics from other areas in the spring-wheat belt; nor is any other state or province. Subdivisions of the spring-wheat belt which are truly homogeneous are not definitely known. It is doubtful if state or provincial boundaries serve to distinguish homogeneous areas one from the other. Thus the conditions of wheat production in the Red River Valley may be truly homogeneous, and quite different from the conditions of wheat production in the semi-arid regions of Montana and western North Dakota or on the prairie lands of Saskatchewan. But the Red River Valley falls within three political areas: Minnesota, North Dakota, and Manitoba. An adequate analysis of costs and profits in wheat production should be based not upon political geography, but upon type-of-farming geography. In this field so little investigating has been done that the distinct areas of even the American part of the spring-wheat belt cannot, without exhaustive inquiry, be distinguished one from the other.

The importance of such delimitation is clear with respect to Minnesota. This state contains in the southwestern corner an area where corn and hogs, not wheat, are the chief farm products; an area in the southeastern corner where dairying is of foremost importance; an undeveloped area in the northeast, and an area devoted to small grains, chiefly wheat, in the northwest. In this last area wheat is probably quite as important a crop as it is in Manitoba; the system of farming differs decidedly from that in the other three sections of the state; and costs and profits on wheat in this section are quite as important as they are in Saskatchewan. But it is possible to conclude from the use of state averages that wheat is of comparatively no importance in Minnesota, when, as a matter of fact, it is of very great importance in a comparatively small portion of the state, and of no importance in other portions.

What is true of Minnesota is perhaps equally true of the other political divisions of the spring-wheat belt. Before accurate analysis of differences in the conditions of agricultural production between areas of the spring-wheat belt can be made, the areas must be properly delimited. State averages, whether of cost, profit, yield, or price, are perhaps of value to combine, but not always of equal value to compare. Some useful information is provided from state averages; but far more promises to be forthcoming if and when type-of-farming areas are delimited and statistical data are presented not on a state basis but upon the basis of homogeneous agricultural areas.

IX. SUMMARY AND CONCLUSIONS

This study consists primarily of an analytical interpretation of average costs of producing wheat in the seven political subdivisions of the spring-wheat belt of North America, for a pre-war period, 1908–14, and a post-war period, 1921–24. By methods fully set forth in a supplementary document, data given by official investigations for specific years were used to construct comparable cost schedules for each area in the average year of the pre-war and post-war periods. This process, while involving numerous estimates and approximations, yielded material more significant for intensive comparative study than any previously published data as they stand. In particular it brought out the importance of certain matters heretofore under-emphasized—the influence of yields on costs per acre, the effect of summer fallowing on costs per acre, and the significance of computing land charges on cash rental compared to other bases.

Comparisons of costs excluding land charges in the pre-war period show wide variations in the different areas. Per-bushel

costs in North Dakota were 61 per cent higher than in Montana; per-acre costs were 61 per cent higher in Alberta than in South Dakota. No consistent relationship was observable between per-acre and per-bushel costs. Differences in pre-war per-bushel costs were due chiefly to differences in yields per acre; but different labor rates, cultural methods, and transportation facilities were also influential.

Between the two periods, costs per bushel excluding land charges rose by a minimum of 40 per cent in Saskatchewan and South Dakota, and a maximum of 136 per cent in Montana. Per-acre costs rose only 23 per cent in Alberta, but 57 per cent in Minnesota. In all areas prices of labor and materials rose, but less extensively in some areas than in others. In some areas, notably Montana and Alberta, yield declined; and this contributed to sharp increases in costs per bushel while keeping down increases in costs per acre. Summer fallowing was of importance in increasing costs in Manitoba. The different factors affecting costs have been many—wages; prices of materials and land; yield; changes in machinery and methods; summer fallowing; new breaking; and transportation facilities. They have been of unequal effect on costs in each area, and they have worked in different directions. The rank of areas in costs changed strikingly between periods.

The calculation of land charges and their inclusion as costs, possible only for the post-war period, showed diminished differences in costs per bushel. Costs per bushel excluding land charges ranged from 81.5 cents in Saskatchewan to 97.7 cents in North Dakota; but costs per bushel including land charges ranged only from $1.08 to $1.20 in the same areas. Since costs per bushel depend so greatly upon yield per acre, it was impossible to designate the area which could consistently produce most cheaply. Costs per bushel including land charges tend in the long run to become equal, since land charges tend to offset other differences. Hence costs per bushel including land charges are likely to vary among areas less and less as the periods to which costs are applicable are extended.

The general impression that Canadian spring-wheat growers are able consistently to produce at materially lower costs per bushel than American farmers is not well founded. In both countries, and notably in Canada, costs vary greatly from year to year. Although land prices are generally lower in Canada than in the United States, land charges per acre for wheat-growing in the spring-wheat belt are not considerably lower in Canada; yet the contrary is commonly assumed.

The prevalence of the practice of summer fallowing in Canada raises not only land charges per acre, but labor and materials charges as well. At present it appears that the yield per acre in Canada must be about three or four bushels in excess of American yield before costs per bushel are equalized in the two countries. If the Canadian yield surpasses the American by more than three bushels, Canadian farm costs per bushel will be lower than American, but otherwise not. For the period 1921–24, Canadian costs per bushel have been slightly, but not materially, lower than American. They may be either higher or lower for the periods 1921–25 or 1921–26, depending on yield per acre. Canada cannot consistently and invariably produce spring wheat at a lower farm cost than the United States.

To base a wheat tariff on differences between costs of production in Canada and the United States is neither scientific nor practical. It is improper to assume that a normal or semi-permanent difference in production costs exists; yet such an assumption lies behind the present duty of 42 cents. Carried out to its logical conclusion, this method would yield little or no protection. In order to satisfy the basic ideal of the cost-of-production formula, differences between American and Canadian costs should be ascertained yearly, and it should be possible promptly to increase or decrease the duty by more than 50 per cent of 30 cents. Even if yearly differences should be ascertained, however, the problem of determining what costs to compare would remain. If weighted-average costs are compared, inadequate protection is given to between 25 and 35 per cent of American producers. If bulk-line

costs are compared, the percentage of American producers who do not deserve protection on account of their inefficiency must be arbitrarily designated. Under the present law and accepted methods of revision, the tariff on wheat can easily be increased though only slightly; but it can be decreased only with difficulty.

The level of average wheat production costs, when changes in the value of money are eliminated, at first glance appears to have declined in the spring-wheat belt as a whole between the two periods, since costs rose only 52 per cent, while the general price level rose 53.5 per cent in the United States and 78 per cent in Canada. Farm technique appears to have improved. But the decline in the level of "real" costs is not marked. It cannot be designated as a permanent decrease capable of affecting the wheat-price level ultimately. For the 1921–24 average yield is not necessarily the normal yield; a change in the level of average costs is not necessarily a change in price-affecting marginal costs; and costs in the spring-wheat belt may not be representative of world costs. Yet there is at least a possibility that the level of marginal wheat-production costs has declined, and hence that wheat prices under post-war conditions should not be expected to be in the same ratio to prices of other commodities as they were before the war.

Profits per acre have varied considerably between areas in the same period, for costs per acre, yield per acre, and price per bushel have varied. Net losses in Canada were not lower than in the United States during the post-war period, for Canadian costs were higher and prices lower than American to an extent sufficient to counterbalance higher Canadian yields. Profits declined in all areas between the two periods, for costs rose faster than prices; but the decline was more marked in some areas than in others—notably in areas like Montana and Alberta where yield declined decidedly between the periods.

Variations in profits per acre of wheat or a general decline in profits per acre do not measure prosperity in the spring-wheat belt satisfactorily. Wheat was and is a less important source of income in Minnesota, South Dakota, Montana, and Alberta than it was and is in Manitoba, North Dakota, or Saskatchewan. It was and is of unequal importance between any two areas, or between Canada and the United States, because other crops and livestock were and are of unequal importance as sources of farm income. Again, conditions of tenure differ considerably in different areas; and low profits or actual losses per acre are more of a menace to prosperity in an area where tenants or mortgaged farms are many. Further, farmers who must hire much labor feel the effects of losses per acre more than farmers who hire little, and of this matter little is known. Finally, to employ state averages is in a sense to misrepresent the facts not only of profits, but of yields, prices, and costs as well. This misrepresentation cannot be avoided, so long as published statistical material is compiled upon the basis of political geography rather than upon that of economic geography.

Analysis of the best cost statistics obtainable on wheat in the spring-wheat belt thus throws no great light upon fundamental economic problems. The fact is that cost statistics, particularly those applicable to crops whose yield is variable, are exceedingly unstable. Under static conditions, statistics of cost covering long periods of years would be of considerable value, but under dynamic conditions their value remains problematical. The most significant aspect of cost statistics is that they sum up and reflect—when properly compiled—changes in the conditions of agricultural production. Their value in diagnosing agricultural prosperity or in providing a sound basis for price-regulating legislation, direct or indirect, is slight. They are perhaps more subject to misinterpretation than any other type of agricultural statistics. Their forms are many, and they may be put to some uses and many abuses. It is hoped that the preceding pages have shown what can and what cannot properly be deduced from the best available statistics of wheat production costs in the spring-wheat area. Negative deductions outnumber positive; but even negative conclusions are not without considerable significance.

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APPENDIX

SOME ANALOGIES TO EXPENSE OF SUMMER FALLOWING

The analysis in this paper brings out the fact that the practice of summer fallowing, in Canada to a notable degree, involves expenses which are commonly overlooked in computing the costs of wheat production. Indeed, summer fallowing is of such importance in its influence on costs that it serves largely to invalidate the current opinion that costs of wheat production are lower in the Canadian than in the American section of the spring-wheat belt.

The cost of wheat production in the winter-wheat belt is probably increased more than is commonly realized by a cultural necessity roughly analogous to that of summer fallowing in Canada: that is, by abandonment. There is one important difference: abandonment varies greatly from year to year, whereas the acreage of summer fallow varies to a much smaller degree. In certain years, and in certain localities, as high as 92 per cent[1] of the fall-sown winter-wheat acreage may be abandoned. Part of the abandoned land may be, and is, sown to substitute crops; but part of it is either cultivated as fallow, simply allowed to grow up as weeds, or employed as pasture. An accurate accounting for the cost of the winter-wheat crop must include the costs of tilling and planting the acreage subsequently abandoned, allowing proper credits for substitute crops or pasture when the abandoned acreage is so employed. In order to achieve an accurate accounting on a large scale, however, more must be known than we know at present concerning the uses to which abandoned winter-wheat acreage is ordinarily put.

This lack of knowledge of the uses to which abandoned wheat acreage is actually put from year to year is capable of affecting cost statistics considerably. The Department of Agriculture has published statistics of average costs of production in Kansas, Nebraska, and Missouri in the years 1913–23.[2] These statistics were computed on the basis of costs determined in 1919. Yet costs of abandonment in other years may not have been the same in proportion to other costs as they were in 1919, though how nearly they were the same nobody knows with any accuracy.

In certain sections of the corn belt the cultivation of oats is a necessity in the crop rotation, just as fallowing is a necessity in Canada. When corn-livestock is the main farm enterprise, the accounting for the corn crop might better regard the cultivation of oats as part of the expense of producing corn, oats being given appropriate credits. This procedure would result in increasing the costs of corn production, since the value of the oats crop seems often not to equal its specific costs of production. To regard oats as a by-product would also affect orthodox economic reasoning. If oats is a by-product of corn production, there seems to be no good reason to suppose that the price of oats should in the long run, or ever, be determined by the cost of production of the marginal producer. Oats would continue to be produced, regardless of margins between cost and price, simply because their cultivation is necessary as a part of the crop rotation.

This reasoning might conceivably be extended to all crops and other farm products which in important producing areas are by-products in the farm enterprise. Almost all crops—wheat in the corn belt, corn in the cotton belt, and so on—may be so regarded to a greater or less degree.

[1] In Ford County, Kansas, in 1917. *Agriculture Yearbook, 1923*, p. 646.

[2] *Agriculture Yearbook, 1923*, p. 649.

TABLE I.—AVERAGE ITEMIZED COSTS PER ACRE OF PRODUCING WHEAT, EXCLUDING LAND RENT, IN THE SPRING-WHEAT BELT, BY AREAS FOR SPECIFIC YEARS, AS PUBLISHED*

Area	Year	Number of reports	Commercial fertilizer	Manure	Preparation of soil	Seed	Planting or seeding	Cultivating	Harvesting	Threshing	Preparing for market	Hauling and cleaning	Market	Wear and tear of impl.	Miscellaneous	Total	Yield per acre	Credit for by-products
			$	$	$	$	$	$	$	$	$	$	$	$	$	$	bu.	$
PRE-WAR																		
Minnesota	1909	210	.18	[c]	1.90	1.59	.42	[c]	1.35	[b]	1.34 [h]	[d]	[d]	[b]	.55 [k]	7.33	16.4	.45
North Dakota	1909	177	.06	[c]	1.95	1.31	.44	[c]	1.03	[b]	1.60 [h]	[d]	[d]	[b]	.38 [k]	6.77	14.4	.24
South Dakota	1909	190	.11	[c]	1.46	1.38	.41	[c]	1.18	[b]	1.22 [h]	[d]	[d]	[b]	.39 [k]	6.15	14.4	.20
Montana	1909	22	[b]	[c]	2.55	1.36	.54	[c]	1.72	[b]	2.05 [h]	[d]	[d]	[b]	1.00 [k]	9.22	28.6	[b]
Manitoba	1911	131	[c]	[c]	2.16	1.43	.80 [f]	[b]	1.26	2.38 [g]	[c]	[b]	[b]	.44	[b]	8.47	21.0	1.00
Saskatchewan	1911	326	[c]	[c]	3.21	1.33	.91 [f]	[b]	1.17	2.81 [g]	[c]	[b]	[b]	.45	[b]	9.88	20.0	1-2.00
Alberta	1911	153	[c]	[c]	3.13	1.56	.71 [f]	[b]	1.61	2.59 [g]	[c]	[b]	[b]	.43	[b]	10.03	24.0	1.00
POST-WAR[a]																		
Minnesota	1923	300	.06	.90	3.52 [e]	1.81	[b]	[b]	1.95	1.89	[c]	[b]	1.11 [j]	[b]	2.51 [k]	13.75	14.6	.78
North Dakota	1923	411	.01	.25	3.25 [e]	1.34	[b]	[b]	1.28	1.83	[c]	[b]	.68 [j]	[b]	1.85 [k]	10.49	8.6	.32
South Dakota	1923	318	[b]	.32	2.50 [e]	1.36	[b]	[b]	1.50	1.82	[c]	[b]	1.02 [j]	[b]	2.24 [k]	10.76	11.8	.40
Montana	1923	283	.02	.32	4.71 [e]	1.10	[b]	[b]	1.62	2.41	[c]	[b]	1.84 [j]	[b]	2.97 [k]	14.99	16.0	.84
After stubble																		
Manitoba	1923	146	[c]	[c]	2.44	1.53	.50	.69	1.55	1.88	[c]	.97 [i]	[b]	.58	[b]	10.14	12.75	[c]
Saskatchewan	1923	207	[c]	[c]	2.46	1.30	.59	.51	1.60	2.63	[c]	1.37 [i]	[b]	.52	[b]	10.98	18.50	[c]
Alberta	1923	118	[c]	[c]	2.55	1.28	.62	.57	2.05	2.78	[c]	1.90 [i]	[b]	.62	[b]	12.37	24.75	[c]
After fallow																		
Manitoba	1923	146	[c]	[c]	3.88	1.57	.52	.99	1.72	2.21	[c]	1.05 [i]	[b]	.71	[b]	12.65	15.75	[c]
Saskatchewan	1923	207	[c]	[c]	4.15	1.40	.59	.60	1.76	3.38	[c]	1.72 [i]	[b]	.60	[b]	14.20	24.75	[c]
Alberta	1923	118	[c]	[c]	4.23	1.42	.63	.80	2.29	3.75	[c]	2.37 [i]	[b]	.69	[b]	16.18	33.00	[c]

* Sources: *Crop Reporter*, May 1911, XIII, 36f; *Census and Statistics Monthly*, March 1912, V, 51–57; *Crops and Markets*, June 1924, I, *Supplement 6*, pp. 126–27; *Cost of Grain Production in Canada, 1923.*

[a] American figures for 1923 have been furnished by the U. S. Department of Agriculture. The published results of the 1923 investigation list costs not by states but by geographical divisions.

[b] Items requested but not reported, or not reported separately.

[c] Items not requested.

[d] Items not certainly requested, reported, or included in other items.

[e] Includes planting or seeding.

[f] Includes cultivation.

[g] Includes hauling to market or marketing.

[h] Includes threshing.

[i] Includes marketing.

[j] Includes hauling and cleaning.

[k] Includes wear and tear of implements.

TABLE II.—AVERAGE ITEMIZED YEARLY COSTS PER ACRE, EXCLUDING LAND CHARGES, OF PRODUCING WHEAT IN THE SPRING-WHEAT BELT UNDER PRE-WAR AND POST-WAR CONDITIONS, BY AREAS*

Area	Number of reports	Seed	Operations before harvest	Harvesting and marketing	Wear and tear of implements	Miscellaneous	Total	Yield per acre	Area
		$	$	$	$	$	$	bu.	
PRE-WAR									PRE-WAR
Minnesota	210	1.59	2.32	2.84	.45	.75	7.95	14.0	Minnesota
North Dakota	177	1.31	2.39	2.57	.38	.71	7.36	11.1	North Dakota
South Dakota	190	1.38	1.87	2.37	.39	.64	6.65	10.9	South Dakota
Montana	22	1.36	3.09	4.31	.50	.97	10.23	24.8	Montana
Manitoba	131	1.43	2.96	3.28	.44	.85	8.96	17.8	Manitoba
Saskatchewan	326	1.33	4.12	3.74	.45	.99	10.63	18.3	Saskatchewan
Alberta	153	1.56	3.84	3.89	.43	1.00	10.72	21.1	Alberta
POST-WAR									POST-WAR
Minnesota	300	1.81	3.57	5.16	.55	1.50	12.59	14.5	Minnesota
North Dakota	411	1.34	3.37	4.97	.45	1.01	11.14	11.4	North Dakota
South Dakota	318	1.36	2.49	4.41	.50	1.32	10.08	11.8	South Dakota
Montana	283	1.10	4.83	5.78	.60	1.91	14.22	14.5	Montana
Manitoba	146	1.55	4.65	4.96	.65	1.48	13.29	14.9	Manitoba
Saskatchewan	207	1.34	4.48	5.40	.55	1.60	13.37	16.4	Saskatchewan
Alberta	118	1.34	4.46	4.95	.65	1.73	13.13	15.2	Alberta

*This table displays in final form the results of adjustments and estimates made to render data of Table I comparable and to transform costs in specific years into average yearly costs for each period. Details of computation are given in a mimeographed supplement obtainable from the Food Research Institute on request.

TABLE III.—VOLUME OF PRODUCTION OF ALL WHEAT IN SEVEN AREAS OF THE SPRING-WHEAT BELT, 1908–14 AND 1921–24*

(Million bushels)

Year	Minnesota	North Dakota	South Dakota	Montana	Total four states	Total United States	Manitoba	Saskatchewan	Alberta	Total three provinces	Total Canada	Year
1908	68.6	68.4	37.9	3.7	178.6	664.6	50.3	34.7	6.8	91.9	112.4	1908
1909	57.0	116.8	47.1	6.3	227.2	683.4	52.7	85.2	9.6	147.5	166.7	1909
1910	64.0	38.5	46.7	7.7	156.9	635.1	34.1	67.0	9.1	110.2	132.0	1910
1911	43.9	73.2	14.8	12.3	144.2	621.3	62.7	109.1	36.6	208.4	230.9	1911
1912	67.0	143.8	52.2	19.3	282.4	730.3	63.0	107.0	34.3	204.3	224.2	1912
1913	68.0	78.9	34.0	20.7	201.5	763.4	53.3	121.6	34.4	209.3	231.7	1913
1914	43.0	81.6	31.6	18.4	174.5	891.0	38.6	73.5	28.9	141.0	161.3	1914
Average 1908–14	58.8	85.9	37.7	12.6	195.0	712.7	50.7	85.4	22.8	158.9	179.9	Average 1908–14
1921	22.9	80.8	25.9	33.4	163.0	814.9	39.1	188.0	53.0	280.1	300.9	1921
1922	27.3	126.6	40.0	52.7	246.6	867.6	60.1	250.2	65.0	375.2	399.8	1922
1923	23.4	71.4	27.5	47.7	170.0	797.4	35.8	271.6	144.8	452.3	474.2	1923
1924	36.5	134.6	34.1	51.7	256.9	872.7	41.5	132.9	61.3	235.7	262.1	1924
Average 1921–24	27.5	103.3	31.9	46.4	209.1	838.1	44.1	210.7	81.0	335.8	359.2	Average 1921–24

* Sources: Canada—*Census and Statistics Monthly*, December 1908, p. 119; December 1909, p. 239; January 1915, pp. 4ff. *Monthly Bulletin of Agricultural Statistics*, January 1925, pp. 15ff. United States—*Agriculture Yearbook, 1908*, p. 609; *1912*, p. 571; *1914*, p. 525; *1921*, p. 603. *Crops and Markets*, December 1924 *Supplement*, p. 462.

TABLE IV.—VOLUME OF PRODUCTION OF SPRING WHEAT, INCLUDING DURUM, IN SEVEN AREAS OF THE SPRING-WHEAT BELT, 1908–14 AND 1921–24*

(Million bushels)

Year	Minnesota	North Dakota	South Dakota	Montana	Total four states	Total United States	Manitoba	Saskatchewan	Alberta	Total three provinces	Total Canada	Year
1908	68.6	68.4	37.9	3.7	178.6	226.7	50.3	34.7	3.8	88.8	[a]	1908
1909	94.1	90.8	47.6	4.8	237.3	265.6	52.7	85.2	7.6	145.5	150.6	1909
1910	94.1	36.1	46.7	4.3	181.2	201.0	34.0	67.0	6.7	107.7	111.7	1910
1911	43.9	73.2	14.8	5.0	136.9	190.7	62.3	109.0	28.9	200.2	205.1	1911
1912	67.0	143.8	52.2	7.7	270.7	330.3	62.7	106.9	29.7	199.3	203.8	1912
1913	67.2	78.9	33.1	8.4	187.6	239.8	52.9	121.5	30.1	204.5	209.1	1913
1914	42.0	81.6	30.6	7.3	161.5	206.0	38.4	73.4	24.2	136.0	140.4	1914
1921	21.7	80.8	24.9	27.5	154.9	214.6	39.1	188.0	51.6	278.7	285.3	1921
1922	26.0	126.6	38.2	41.0	231.8	280.7	60.1	250.2	64.1	374.4	380.8	1922
1923	21.6	71.4	26.3	37.1	156.4	225.4	35.8	271.6	142.5	449.9	454.9	1923
1924	34.3	134.6	33.0	40.8	242.7	282.6	41.5	132.9	60.8	235.2	239.8	1924

* Sources: Canada—See Table III. United States—*Agriculture Yearbook, 1908,* p. 610; *1909,* p. 447; *1910,* p. 513; *1911,* p. 532; *1912,* p. 570; *1913,* p. 380; *1914,* p. 523. *Weather, Crops, and Markets,* December 29, 1923, pp. 670f. *Crops and Markets,* December 1924 *Supplement,* p. 400.

The 1908–10 figures for state areas and the 1908 figure for the United States are not comparable with those of Table II, which were revised on the basis of the 1910 census.

[a] Not available.

TABLE V.—ACREAGE OF ALL WHEAT IN SEVEN AREAS OF THE SPRING-WHEAT BELT, 1908–14 AND 1921–24*

(Thousand acres)

Year	Minnesota	North Dakota	South Dakota	Montana	Manitoba	Saskatchewan	Alberta	Year
1908	5,356	5,899	2,958	153	2,957	2,396	271	1908
1909	3,277	8,189	3,217	258	2,808	3,685	385	1909
1910	4,000	7,700	3,650	350	2,760	4,228	879	1910
1911	4,350	9,150	3,700	429	3,095	5,256	1,640	1911
1912	4,325	7,990	3,675	803	2,839	5,582	1,590	1912
1913	4,200	7,510	3,775	870	2,804	5,720	1,512	1913
1914	4,050	7,285	3,469	910	2,616	5,348	1,371	1914
Average 1908–14	4,223	7,675	3,492	539	2,840	4,602	1,093	Average 1908–14
1921	2,371	9,500	2,845	2,715	3,501	13,557	5,123	1921
1922	1,989	8,980	2,989	3,618	3,126	12,332	5,766	1922
1923	1,840	9,650	2,812	3,274	2,916	12,791	5,173	1923
1924	1,674	8,685	2,296	3,154	2,459	13,033	5,574	1924
Average 1921–24	1,968	9,204	2,736	3,190	3,000	12,928	5,409	Average 1921–24

* Sources: Canada—*Census and Statistics Monthly,* December 1910, p. 292; January 1915, pp. 17ff. *Monthly Bulletin of Agricultural Statistics,* January 1925, pp. 15ff. United States—*Agriculture Yearbook, 1908,* p. 609; *1912,* p. 571; *1914,* p. 525; *1923,* p. 603. *Crops and Markets,* December 1924 *Supplement,* p. 402.

TABLE VI.—AVERAGE YIELD PER ACRE OF ALL WHEAT IN SEVEN AREAS OF THE SPRING-WHEAT BELT, 1908–14 AND 1921–24*

(Bushels per acre)

Year	Minnesota	North Dakota	South Dakota	Montana	Average four states [a]	Manitoba	Saskatchewan	Alberta	Average three provinces [a]	Average all areas [a]	Year
1908	12.8	11.6	12.8	24.2	12.4	17.0	14.5	25.2	16.3	13.5	1908
1909	16.8	13.7	14.1	30.8	14.8	18.8	23.1	24.9	21.4	16.9	1909
1910	16.0	5.0	12.8	22.0	10.0	12.4	15.8	10.3	14.0	11.3	1910
1911	10.1	8.0	4.0	28.7	8.2	20.3	20.8	22.3	20.9	12.8	1911
1912	15.5	18.0	14.2	24.1	16.8	22.2	19.2	21.6	20.4	18.2	1912
1913	16.2	10.5	9.0	23.8	12.3	19.0	21.3	22.7	20.9	15.6	1913
1914	10.6	11.2	9.1	20.2	11.1	14.8	13.7	21.0	15.1	12.6	1914
Average 1908–14	14.0	11.1	10.9	24.8	12.2	17.8	18.3	21.1	18.4	14.4	Average 1908–14
1921	9.7	8.5	9.1	12.3	9.4	11.2	13.8	10.4	12.6	11.2	1921
1922	13.7	14.1	13.4	14.6	14.0	19.3	20.3	11.3	17.7	16.0	1922
1923	12.7	7.4	9.6	14.6	9.6	12.3	21.3	28.0	21.7	16.2	1923
1924	21.8	15.5	14.9	16.4	16.3	16.9	10.2	11.0	11.2	13.4	1924
Average 1921–24	14.5	11.4	11.8	14.5	12.4	14.9	16.4	15.2	15.8	14.2	Average 1921–24

* Sources: Canada—*Census and Statistics Monthly*, December 1908, p. 119; December 1909, p. 239; December 1915, pp. 17ff. *Monthly Bulletin of Agricultural Statistics*, January 1925, pp. 15ff. United States—*Agriculture Yearbook, 1923*, p. 605; *Crops and Markets*, December 1924 *Supplement*, p. 402.

a Weighted averages calculated on acreage statistics of Table V.

TABLE VII.—AVERAGE FARM PRICES RECEIVED BY PRODUCERS FOR ALL WHEAT IN SEVEN AREAS OF THE SPRING-WHEAT BELT, 1908–14 AND 1921–24*

(Dollars per bushel)

Year	Minnesota	North Dakota	South Dakota	Montana	Manitoba	Saskatchewan	Alberta	Year
1908	.940	.908	.892	.852	.83	.75	.68	1908
1909	.956	.908	.890	.878	.87	.81	.73	1909
1910	.976	.936	.914	.906	.80	.69	.69	1910
1911	.944	.910	.912	.804	.67	.58	.62	1911
1912	.780	.740	.728	.652	.67	.56	.54	1912
1913	.770	.738	.722	.645	.71	.64	.61	1913
1914	1.010	.998	.934	.874	1.01	.95 [a]	.91	1914
Average 1908–14	.910	.877	.856	.801	.794	.711	.683	Average 1908–14
1921	1.026	.918	.924	.926	.91	.76	.77	1921
1922	.982	.864	.854	.876	.83	.85	.77	1922
1923	.986	.892	.830	.890	.67	.65	.65	1923
1924	1.285	1.258	1.238	1.230	1.24	1.21	1.20	1924
Average 1921–24	1.069	.983	.961	.980	.913	.868	.848	Average 1921–24

* American prices are averages of prices received by producers (as reported by crop correspondents in periodical publications of the United States Department of Agriculture) on the first of the five months, September to January, except: a) for 1913, when January 1 prices were not available; b) for 1923, when the first of the month prices for January 1924 were not reported, and a January 1 price was calculated upon reported December 1 and January 15 prices; and c) 1924, for which an average of prices reported for the 15th of the four months, September to December, has been calculated. This method of averaging is regarded as rendering American farm prices comparable with Canadian.

Canadian prices are from estimates of average prices "at local markets" or "as received by producers" submitted yearly by Canadian crop correspondents in December, and published in *Census and Statistics Monthly* or the *Monthly Bulletin of Agricultural Statistics*. See sources for Table VI.

a The reported farm price in Saskatchewan for 1914 was $1.48 per bushel. This figure is palpably an error, probably clerical, in view of the fact that spot prices of No. 1 Manitoba wheat during the months September to December, 1914, at Fort William and Port Arthur never exceeded $1.18. Farm price for all wheat in Saskatchewan must have been considerably lower than spot prices of No. 1 Manitoba at these ports, and hence the 1914 price has been brought into line with farm prices in Alberta and Manitoba.

TABLE VIII.—AVERAGE MONTHLY WAGES OF MALE FARM LABOR HIRED BY THE YEAR, INCLUDING THE VALUE OF BOARD, IN SEVEN AREAS OF THE SPRING-WHEAT BELT, 1908–14 AND 1921–24*

(Dollars)

Year	Minnesota	North Dakota	South Dakota	Montana	Manitoba	Saskatchewan	Alberta	Year
1908	a	a	a	a	a	a	a	1908
1909	38.90	45.96	40.75	53.32	30.50	32.50	35.15	1909
1910	38.00	42.00	39.00	50.00	33.35	33.65	34.75	1910
1911	a	a	a	a	a	a	a	1911
1912	a	a	a	a	a	a	a	1912
1913	41.00	42.50	43.00	54.00	a	a	a	1913
1914	40.80	45.10	43.50	52.80	30.35	30.50	30.40	1914
1921	53.10	60.20	53.50	63.00	66.50	66.25	62.15	1921
1922	50.00	55.50	53.00	63.00	53.35	56.00	52.50	1922
1923	55.50	58.80	61.70	65.50	52.60	54.35	58.75	1923
1924	54.50	58.00	59.50	69.10	49.35	55.25	55.40	1924

* Sources: Canada—February issues of *Census and Statistics Monthly* and *Monthly Bulletin of Agricultural Statistics.* Monthly figures are obtained by dividing reported figures of yearly values of wages and board by 12. United States—*The Agricultural Outlook* (Farmers' Bulletin No. 665), March 1915, p. 20; *Agriculture Yearbook, 1920,* p. 819; *1921,* p. 784; *1922,* p. 996; *1923,* p. 1149. Figures for 1924 are averages of wages reported in January, April, July, and October issues of monthly supplements to *Crops and Markets.* a Not available.

TABLE IX.—AREA UNDER WHEAT IN RELATION TO AREA UNDER SUMMER FALLOW IN PRECEDING YEARS, PRAIRIE PROVINCES*

(Thousand acres)

Area and year	Area under wheat	Summer fallow of previous year	Ratio of fallowed acreage to wheat area %
Manitoba			
1906	2,039	682	33.4
1914	2,616	1,144	43.7
1915	2,800	1,208	43.1
1921	3,501	1,410	40.3
1922	3,126	1,612	51.6
1923	2,916	1,597	54.8
1924	2,459	1,518	61.7
Saskatchewan			
1906	1,692	425	25.1
1914	5,348	2,775	51.9
1915	8,929	2,601	29.1
1921	13,557	3,752	27.7
1922	12,332	5,908	47.9
1923	12,791	5,403	42.2
1924	13,033	5,346	41.0
Alberta			
1906	187	47	25.1
1914	a	a	a
1915	a	a	a
1921	5,123	1,834	35.8
1922	5,766	2,276	31.8
1923	5,173	2,460	41.3
1924	5,574	2,760	45.8

* Sources: 1906 figures from Census of 1906, others from table furnished by the Dominion Bureau of Statistics in revision of a similar table appearing in the *Monthly Bulletin of Agricultural Statistics,* November 1923, p. 459.
a Not available.

TABLE X.—ACREAGE OF NEW BREAKING[a] IN THE PRAIRIE PROVINCES*

(Thousand acres)

Year	Manitoba	Saskatchewan	Alberta
1913	156	1,149	b
1914	175	1,076	b
1920	188	550	486
1921	158	616	517
1922	129	433	494
1923	97	425	487

* Source: See Table IX.
a Land newly broken in the years specified would chiefly have been part of the wheat acreage of the years immediately following.
b Not available.

TABLE XI.—CONDITIONS OF TENURE ON FARMS IN THE SPRING-WHEAT BELT IN CENSUS YEARS*

Area and year	Total number of farms	Percentages of all farms		
		Owned	Tenanted	Mortgaged
Minnesota				
1910	156,137	79	21	36
1920	178,478	76	24	39
North Dakota				
1910	74,360	86	14	43
1920	77,690	74	26	52
South Dakota				
1910	77,644	75	25	28
1920	74,637	65	35	36
Montana				
1910	26,214	91	9	18
1920	57,677	89	11	52
Manitoba				
1911	44,328	90	10	a
1921	53,252	89	11	a
Saskatchewan				
1911	95,013	96	4	a
1921	119,451	89	11	a
Alberta				
1911	60,559	96	4	a
1921	82,954	90	10	a

* Sources: Appropriate censuses. a Not available.

TABLE XII.—UTILIZATION OF ALL FARM LAND IN THE SPRING-WHEAT BELT, CENSUS YEARS, 1910, 1920, 1911, 1921*

Area and year	Land in farms (000 acres)	Percentage of all farm land									
		Unimproved	Improved but not in field crops	In wheat	In oats	In corn	In barley	In flax	In rye	In potatoes	In hay
Minnesota											
1910	27,676	29.0	27.8	14.4	10.8	7.4	4.6	1.7	0.4	0.6	3.2
1920	30,222	28.9	25.5	9.5	12.2	10.9	3.0	1.1	1.7	1.1	6.1
North Dakota											
1910	28,427	28.0	28.5	27.1	7.7	0.8	3.5	3.6	[a]	0.1	0.7
1920	36,215	32.2	24.2	24.6	6.9	1.6	3.0	2.1	2.6	0.1	2.7
South Dakota											
1910	26,017	39.1	24.1	14.0	6.0	8.1	3.9	2.5	0.1	0.2	2.0
1920	34,636	47.4	19.9	8.4	6.4	10.5	2.9	0.6	0.5	0.2	3.2
Montana											
1910	13,546	73.1	15.9	2.6	2.9	0.1	0.4	0.4	0.0	0.2	4.4
1920	35,071	68.6	16.6	8.0	1.5	0.5	0.2	1.2	0.1	0.1	3.2
Manitoba											
1911	12,228	44.8	13.3	25.3	10.7	0.1	3.7	0.6	0.0	0.2	1.3
1921	14,600	44.9	12.4	24.0	7.1	0.2	7.1	0.5	1.8	0.3	1.7
Saskatchewan											
1911	28,099	57.8	11.5	18.7	8.3	[a]	0.9	2.4	[a]	0.1	0.2
1921	44,023	43.1	7.4	30.8	12.0	0.2	1.1	1.0	2.7	0.2	0.6
Alberta											
1911	17,359	74.9	5.9	9.5	7.0	0.0	1.0	0.6	0.1	0.1	0.9
1921	29,293	59.8	8.2	17.5	9.9	0.0	1.9	0.1	0.8	0.2	1.6

* Sources: Appropriate censuses.
[a] Less than .1.

TABLE XIII.—UTILIZATION OF CROP LAND AND NUMBERS OF ANIMAL UNITS PER FARM AND PER 100 ACRES IN THE SPRING-WHEAT BELT, CENSUS YEARS, 1910, 1920, 1911, 1921*

Area and year	Acreage in field crops (000 acres)	Percentage of crop land								Animal units [a] per farm	Animal units [a] per 100 acres
		In wheat	In oats	In corn	In barley	In rye	In flax	In potatoes	In hay		
Minnesota											
1910	11,962	33.4	24.9	17.0	10.7	1.0	3.9	1.4	7.6	17.6	10.0
1920	13,778	20.9	26.9	23.9	6.5	3.7	2.3	2.3	13.5	19.7	11.2
North Dakota											
1910	12,365	62.3	17.5	1.7	8.0	0.1	8.6	0.3	1.5	11.5	3.0
1920	15,822	56.4	15.9	3.6	6.8	6.2	4.8	0.5	5.8	19.1	4.0
South Dakota											
1910	9,585	38.0	16.2	21.9	10.7	0.4	6.9	0.6	5.3	23.5	7.0
1920	11,303	25.9	19.6	32.3	9.1	1.8	2.0	0.7	8.6	38.3	8.3
Montana											
1910	1,497	23.4	26.0	1.1	3.5	0.2	4.0	1.7	40.1	36.4	7.1
1920	5,179	53.8	10.3	3.6	1.2	1.1	7.9	0.8	21.3	27.7	4.6
Manitoba											
1911	5,124	60.4	25.5	0.2	8.7	0.1	1.6	0.5	3.0	10.8	3.9
1921	6,222	56.3	16.8	0.5	16.8	4.1	1.0	0.6	3.9	13.6	5.0
Saskatchewan											
1911	8,626	60.9	27.1	0.0	3 2	0.0	7.9	0.3	0.6	7.5	2.5
1921	21,772	62.3	26.1	0.3	2.2	5.5	2.0	0.3	1.3	11.5	3.2
Alberta											
1911	3,333	49.2	36.6	0.1	4.9	0.4	3.2	0.7	4.9	13.3	4.6
1921	9,366	54.7	31.1	0.1	6.1	2.4	0.3	0.5	4.8	18.5	5.3

* Sources: Appropriate censuses.
[a] Counting as equal to one animal unit, one cow, horse, or steer, 5 hogs, or 7 sheep. All animals have been calculated as mature.

WHEAT STUDIES

OF THE

FOOD RESEARCH INSTITUTE

STANFORD UNIVERSITY, CALIFORNIA

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WHEAT STUDIES
OF THE
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VOL. I, NO. 7 STANFORD UNIVERSITY, CALIFORNIA JUNE 1925

EUROPEAN WHEAT PRODUCTION AS AFFECTING IMPORT REQUIREMENTS

THE PROBLEM

The "world market" for wheat is a commonplace of current commercial discussion; yet it is a development which has taken place within the last hundred years. In the third decade of the 19th century wheat prices were 2⅓ times as high in England as in Prussia; in the last decade of that century English prices of wheat were lower than Prussian.[1] A hundred years ago, the financial return of the wheat farmer depended upon the nature of the harvest in a relatively small area; today the wheat growers of America, Argentina, and Australia compete with the European farmer.

Internationalism is so characteristic of the wheat trade that the current method of viewing the wheat situation is from the point of view of international trade. The discussion tends to center around "importers' requirements" and "exportable surpluses," rather than about world demand and supply. In this way, the Australian farmer is conceived to be competing with his English cousin, not directly but indirectly through the medium of "quantity available for export" and "probable imports." An increase in the production of wheat by the Australian farmer tends to swell the exportable surplus of his country; better crops in England tend to diminish requirements from abroad. Since prices rise or fall as the ratio of import requirements to exportable surplus increases or decreases, a better crop in either country tends to depress prices.

At first glance this may appear a needlessly roundabout method of viewing the wheat market. Why not compare the world's supply of wheat directly from one year to the next? The demand for wheat is said to be relatively inelastic, and it might be supposed that the price of wheat would vary inversely with world supplies. If further refinement of calculation should seem necessary, one might compute the trend of wheat consumption and the elasticity of demand for wheat.[2] By substituting the supply for each year in the formulas thus secured, one might expect to reach a figure for world price.

The objections to this method arise principally on the side of demand, for there are marked differences in consumption habits from country to country. By estimating the surplus or deficiency of each country separately, it is possible for a well-informed observer to make allowances for the more obvious of these differences. The estimator in such a case secures as much information as possible on the conditions in each country. By drawing upon his experience he is able to make rough estimates of the effects of these conditions on the consumption of wheat, country by country. From the estimate of probable consumption thus secured it is possible to derive a figure for probable imports or exports by calculating the difference between the consumption figure and

[1] Cf. Louis Perlmann, *Die Bewegung der Weizenpreise und ihre Ursachen* (Schriften des Vereins für Socialpolitik, Vol. 139), Munich and Leipzig, 1914, p. 8.

[2] Cf. R. A. Lehfeldt, "The Elasticity of Demand for Wheat," *Economic Journal*, June 1914, XXIV, 212.

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the best available estimate of domestic production.

It is necessary in this procedure to take account of a number of factors influencing consumption (that is to say, all forms of domestic utilization of wheat) : the price of wheat; the prices and availability of complementary and substitute foods and feeds, notably rye, potatoes, and maize; government regulation of milling; the quality of domestic wheat; economic and financial conditions, etc.[1] Ordinarily such estimates have not taken into account, specifically, the influence of domestic production upon domestic utilization of wheat; but this factor is too important to neglect.

This paper is not intended as an exhaustive discussion of the problem of estimating wheat consumption. Its purpose is rather to show the bearing of wheat production upon domestic consumption and imports of wheat in a selected group of European wheat-importing countries in the pre-war period, and to examine the estimates of Broomhall and Sir James Wilson in two post-war years to discover how this influence is reflected in the estimates of two experienced observers.

Need for Analysis by Countries

In Table 1 eight leading importing countries of Europe, for which information for a considerable pre-war period is available, are listed in order of pre-war self-sufficiency with regard to wheat. Four of the countries —France, Spain, Italy, and Germany—produced more wheat than they imported; and four—Sweden, Belgium, Great Britain, and the Netherlands—imported more than they produced. When ranked according to production, the first group (hereafter called Group A) contains the first four wheat-producing nations. The average production for Group A is nearly ten times that for Group B. On the other hand, imports of Group B countries, owing largely to the volume of British imports, average nearly twice as much as those of Group A countries.

Table 1.—Average Production, Imports, and Domestic Utilization of Wheat from 1902–03 to 1913–14, for Eight Importing Countries*

(Arranged in order of self-sufficiency)

Country	Production		Imports		Domestic utilization	
	Quantity (*Million bushels*)	Rank	Quantity (*Million bushels*)	Rank	Quantity (*Million bushels*)	Percentage produced
Group A						
France	329	1	23	5	352	93.5
Spain	122	4	9	7	131	93.1
Italy	174	2	45	4	219	79.5
Germany	144	3	69	2	213	67.6
Total	769		146		915	
Group B						
Sweden	7	7	8	8	15	46.7
Belgium	14	6	48	3	62	22.6
United Kingdom	56	5	211	1	267	21.0
Netherlands	4	8	20	6	24	16.7
Total	81		287		368	

* Data from *International Institute of Agriculture.*

In considering the supplies of wheat, Europe is often regarded as a unit, i.e., the wheat crops of the entire continent are expressed as a single quantity. When this is done, the countries of Group A have an importance of nearly ten times that of the countries in Group B. When considered from the point of view of imports—and this is the significant aspect for international trade, and in large measure for wheat prices —the countries of Group A, as a whole, are roughly only half as important as those of Group B. The effect of crop conditions in the latter very important group of importers may thus be entirely obscured by the conditions in the countries which produce much more but import much less.

[1] The following quotation from Sir James Wilson, *The World's Wheat in November 1922*, p. 6, illustrates the method used: "*Germany*—The pre-war averages were: Yield 19.0 m. qrs. [a quarter corresponds to 8 bushels], net import 8.5, consumption 27.5. The area and population of Germany have been much reduced, and for the year ending July 1922, the statistics are as follows: Yield 13.5 m. qrs., net import 8.7, available, besides carryover, 22.2. The yield of this year's poor harvest is now officially estimated at only 8.7; so that if Germany required the same quantity of wheat as she apparently did last year, she would require to import during the current cereal year 13.5 m. qrs. Her crops of rye, barley, and oats are also reported to be much below those of last year; but on the other hand, owing to the phenomenal fall in the value of the mark, the cost of importing wheat from abroad is now ruinously high when measured in local currency, and on the whole, Germany may be estimated as likely to import during the current cereal year about 12 m. qrs."

Aggregate figures of European production, or total world production, are often useful for a broad view, but such figures afford an unsatisfactory basis for estimating the international movement of wheat, or for considering the prospective course of wheat prices. Estimates by individual countries are essential.[1]

Variability of Wheat Consumption

In the forecasts of wheat consumption for individual countries it is often implied that European countries maintain, or attempt to maintain, a constant volume of wheat consumption from year to year. This idea has probably developed from the frequent use of bread as an example of a commodity with an inelastic demand. Marshall, for example, has said:

> These exceptional features of the value of grain were probably always recognized more or less by thoughtful people. But they were first clearly set out about a hundred years ago, when Tooke convinced the Commission on the Depression of Agriculture, 1821, that an exceptional "principle" applies to staple grain; because a fall in its price cannot generally increase its consumption as human food; and, when it becomes dear, people will still buy enough of it to keep them alive so long as they have any means of purchase; in modern phraseology the demand for it is exceptionally inelastic.[2]

In some countries and among certain classes of people the consumption of wheat bread is probably nearly constant. On the other hand, there are areas where white bread and sweetened wheaten products are delicacies purchased only when the price is low; and there are large classes of the population with whom wheat bread competes in the diet with rye bread, potatoes, and even with maize. In the Germanic, Scandinavian, and North Slavic populations wheat and rye are traditionally merged into the concept bread grain, mixed bread is common, and in the country districts the two grains are freely substitutable. Obviously some fluctuation, possibly large, in the annual consumption of wheat may be expected under these conditions.

Still greater variations in the consumption of wheat are to be found in the other uses to which this cereal is put, notably as a feedstuff. The proportion of unmillable wheat in the crop varies widely from year to year. Wheat is used in the diet of farm animals sometimes directly, at other times after having been ground or mixed with other material, as is the case in many prepared poultry feeds. In the field of animal nutrition wheat has strong competitors. Maize, oats, barley, and other grains, as well as cottonseed cake and meal, compete with wheat as animal feedstuffs; and the demand for any one of them is determined largely by their relative prices in any given season.

In the countries in Group A, especially, variations occur in the consumption of wheat both as bread and as feed for farm animals. Consequently it is impossible to predict accurately the imports into these countries by assuming that the consumption of wheat will be the same year after year. In addition, a considerable proportion of the wheat crop of these countries is domestically produced. The import movement of grain is often quite small, and it rarely attains large proportions. As a result the development of grain trade is far behind that of the exporting countries, or of those importing countries which always import considerable quantities of wheat. The lack of facilities for distributing grain not only tends to raise prices unduly in lean years, but makes impossible a flow of grain sufficient to compensate for the poor harvests in these countries.[3]

Influence of Domestic Production

These considerations are of special significance in a study of the bearing of domestic crops upon consumption. In the countries of Group A a substantial proportion of the wheat crop is consumed in the province or community where it is

[1] In this connection, however, mention must be made of the formula recently devised by the United States Department of Agriculture for forecasting the May price of Northern Spring Wheat in Chicago from the September price. *Foreign Crops and Markets*, May 11, 1925, pp. 549 ff. This formula rests largely upon changes in production in the Northern Hemisphere as a unit and the Southern Hemisphere as a unit, and takes no account of international wheat movements as such.

[2] Alfred Marshall, *Industry and Trade*, London, 1919, p. 794.

[3] Cf. Perlmann, *op. cit.*, p. 12.

grown. Although none of these four countries is self-sufficient, each contains large areas which are practically independent of outside sources of supply. In such regions the domestic utilization of wheat is in direct proportion to production. When the harvest is bountiful the grain is used in larger quantities and in a greater variety of ways; when the harvest is meager the peasant "tightens his belt," practices "rural economies," but rarely imports wheat to make up the regional deficit.

In those countries, on the other hand, where imported wheat, or flour made from imported wheat, penetrates the most remote districts, the nature of the harvest has relatively little effect upon the domestic utilization of wheat. An increase in imports tends to compensate for a large part of the deficiency of local crops, in quantity and quality. Variations in the consumption of wheat may occur, and the returns of the local harvest may be one of the contributing factors; but the relationship is much less pronounced than in the case of the more nearly self-sufficient countries.

TABLE 2.—CORRELATION OF PRODUCTION WITH DOMESTIC UTILIZATION OF WHEAT, 1902–03 TO 1913–14, FOR EIGHT EUROPEAN IMPORTING COUNTRIES*

Group A countries	Coefficient of correlation	Group B countries	Coefficient of correlation
France	+ 0.71 ± .10	Sweden	+ 0.41 ± .16
Spain	+ 0.89 ± .04	Belgium	— 0.04 ± .19
Italy	+ 0.77 ± .08	United Kingdom	+ 0.32 ± .18
Germany	+ 0.80 ± .07	Netherlands	+ 0.20 ± .19

* Using in each case deviations from linear trend, determined by the method of least squares.

A strong tendency for domestic utilization to vary with domestic production in Group A countries is demonstrated in Table 2 by the use of the statistical device of correlation. High positive coefficients of correlation were found between production and consumption for all these countries. The coefficients range from +0.71 to +0.89, in every case more than six times the probable error. In Group B countries, on the other hand, although there is some indication of correlation in the case of Sweden, no definite proof of such a relationship is found. Even for Sweden the coefficient of correlation is less than three times the probable error.

While these results are prejudiced by the briefness of the period, they are sufficiently conclusive to warrant careful consideration, although they may not be acceptable as a basis for forecasting consumption in the post-war period.[1]

POST-WAR ESTIMATES CONSIDERED

The estimates of Sir James Wilson and Broomhall in 1922 and 1923 may now be considered. The outstanding features of European wheat crops from 1921 to 1923 may be summarized thus:

(1) Large crops in 1921,
(2) Small crops in 1922,
(3) Large crops in 1923.

In 1922 the problem was to estimate the increase in imports to be expected as a result of the diminished crop. In 1923 it was the reverse, that is, the effect of increased crops upon imports. In Tables 3 and 4 the estimates of Sir James Wilson and of Broomhall for the eight countries discussed above are shown, and changes in actual imports, as later reported by the same authorities, are also given for comparison. Table 5 (p. 214) is based on the latest reports of production and imports published by the International Institute of Agriculture.

It is significant that in 1922 neither Sir James Wilson nor Broomhall expected the countries in Group A to increase their imports by an amount equal to the decline in production, while they did anticipate that the deficit in the Group B countries would be largely compensated. A number of reasons were given in explanation of the forecast of diminished consumption in the Group A countries—high prices, financial

[1] The series have been extended as far back as the publications of the International Institute of Agriculture permit. The war and post-war period has been omitted because of the abnormal circumstances and because it is impossible to secure any definite idea of trend for consumption or production during this period. When series were used extending from 1902–03 to 1922–23, with no correction for secular trend, somewhat higher correlations were secured in every case, except Spain and Italy. This seems to have been due to the fact that, in many cases, the trends of consumption and production were very much alike.

conditions, and governmental regulations. The tendency of consumption to decrease with domestic production was not mentioned, although the estimators must have been aware of it and gave it some weight in their computations.

Both Sir James Wilson and Broomhall in advance greatly overestimated the imports of the countries in Group A as a whole. According to the figures of the International Institute of Agriculture, a decline in production of 168 million bushels was accom-

TABLE 3.—SIR JAMES WILSON'S ESTIMATES OF CHANGES FROM PRECEDING YEAR IN WHEAT IMPORTS, 1922–23, 1923–24, FOR EIGHT EUROPEAN COUNTRIES*

(Million bushels)

Country	1922–1923 Change in production [a]	1922–1923 Change in imports Estimated [a]	1922–1923 Change in imports Reported [b]	1923–1924 Change in production [c]	1923–1924 Change in imports Estimated [c]	1923–1924 Change in imports Reported [b]	Country
GROUP A							GROUP A
France	— 88.0	+ 48.0	+ 28.0	+ 47.2	— 13.6	+ 6.4	France
Spain	— 20.0	— 1.6	— 9.6	+ 26.4	0.0	0.0	Spain
Italy	— 33.6	+ 12.0	+ 17.6	+ 63.2	— 53.6	— 44.8	Italy
Germany	— 38.4	+ 26.4	— 32.0	+ 31.2	— 13.6	— 8.0	Germany
Total	— 180.0	+ 84.8	+ 4.0	+ 168.0	— 80.8	— 46.4	Total
GROUP B							GROUP B
Sweden	— 3.2	+ 4.0	+ 5.6	0.0	— 1.6	+ 3.2	Sweden
Belgium	— 4.8	+ 4.0	— 1.6	+ 2.4	+ 1.6	0.0	Belgium
United Kingdom	— 9.6	+ 2.4	+ 10.4 [d]	— 5.6	+ 8.0	+ 16.0 [d]	United Kingdom
Netherlands	— 3.2	+ 4.0	+ 4.0	0.0	0.0	+ 3.2	Netherlands
Total	— 20.8	+ 14.4	+ 18.4	— 3.2	+ 8.0	+ 22.4	Total

* *The World's Wheat.* Figures here are converted from round figures in quarters. Though based on International Institute of Agriculture data, they differ somewhat from latest figures of the International Institute. The process of conversion accounts for certain differences between these figures and those in Table 5.

[a] November 1922. [b] November 1924.
[c] October 1923. [d] Based on rough estimates, including Irish Free State.

TABLE 4.—BROOMHALL'S ESTIMATES OF CHANGES FROM PRECEDING YEAR IN WHEAT IMPORTS, 1922–23 AND 1923–24, FOR EIGHT EUROPEAN COUNTRIES*

(Million bushels)

Country	1922–1923 Change in production [a]	1922–1923 Change in imports Estimated [a]	1922–1923 Change in imports Reported [a d]	1923–1924 Change in production [b]	1923–1924 Change in imports Estimated [c]	1923–1924 Change in imports Reported [d]	Country
GROUP A							GROUP A
France	— 88.8	+ 39.2	+ 35.6	+ 46.4	— 16.8	+ 12.1	France
Spain	— 34.4	+ 6.4	— 8.4	+ 16.6	+ 7.2	— 0.3	Spain
Italy	— 28.8	+ 12.0	+ 17.6	+ 46.4	— 28.0	— 46.9	Italy
Germany	— 38.4	+ 10.4	— 32.0	+ 12.1	— 1.6	+ 6.4	Germany
Total	— 190.4	+ 68.0	+ 12.8	+ 121.5	— 39.2	— 28.7	Total
GROUP B							GROUP B
Sweden	— 4.8	+ 4.4	+ 4.9	+ 0.8	— 2.4	+ 4.2	Sweden
Belgium	— 4.0	+ 4.0	+ 3.2	+ 1.9	+ 1.6	+ 0.8	Belgium
United Kingdom	— 9.6	+ 16.0	+ 0.8	— 1.8	+ 16.0	+ 33.0	United Kingdom
Netherlands	— 4.0	+ 4.0	+ 3.4	+ 0.6	+ 0.8	+ 4.6	Netherlands
Total	— 22.4	+ 28.4	+ 12.3	+ 1.5	+ 16.0	+ 42.6	Total

* Broomhall's figures for imports are really for shipments to these countries.

[a] *Broomhall's Corn Trade News*, October 3, 1922. [b] *Ibid.*, September 4, 1923. [c] *Ibid.*, August 21, 1923. [d] *Broomhall's Corn Trade Year Book*, 1925, p. viii.

panied by a net increase in imports of only 3½ million bushels in this group. This was far below the estimates of either Sir James Wilson (85 million bushels) or Broomhall (68 million bushels).

TABLE 5. — CHANGES FROM PRECEDING YEAR IN WHEAT PRODUCTION AND IMPORTS, 1922–23, 1923–24, FOR EIGHT EUROPEAN COUNTRIES*

(Million bushels)

Country	1922–23		1923–24	
	Change in production	Change in imports	Change in production	Change in imports
GROUP A				
France	— 80.2	+ 28.5	+ 32.3	+ 7.4
Spain	— 19.7	— 8.2	+ 31.6	0.0
Italy	— 32.4	+ 15.2	+ 63.2	— 45.9
Germany	— 35.9	— 32.0	+ 34.5	— 6.6
Total	— 168.2	+ 3.5	+ 161.6	— 45.1
GROUP B				
Sweden	— 3.0	+ 4.9	+ 1.7	+ 3.6
Belgium	— 3.9	— 1.0	+ 2.8	+ 0.8
United Kingdom	— 8.5	+ 2.0	— 6.8	+ 31.2
Netherlands	— 2.4	+ 4.1	0.0	+ 2.8
Total	— 17.8	+ 10.0	— 2.3	+ 38.4

* As reported by *International Institute of Agriculture*, supplemented by official data from the Irish Free State.

The differences between estimated and actual movement are primarily due to the fact that instead of the substantial increase that was expected in German imports, there was a decided decline in purchases by that country. The anomaly of decreased imports into Germany after a decline in production, though partly due to imperfections in statistics, is largely explained in terms of unusual and (at least to some extent) unpredictable circumstances—the precipitous decline of the mark and the general disorganization of the economic life of Germany.

Both Broomhall and Sir James Wilson, however, overestimated imports of two other countries in Group A, by substantial amounts. While in these countries also financial and economic conditions exerted an unpredictable influence, the indications are that the estimators failed to give adequate weight to the tendency of consumption to decline with reduced domestic crops. The errors in estimating imports into Group B countries were much smaller, indeed very small when considered in relation to the actual movement, for the total imports of these countries were substantially greater than those of Group A countries.

The wheat crop of 1923, usually considered a uniformly large harvest, was indeed much larger than that of 1922 in the Group A countries.[1] In Group B countries, however, there was a net decline in production. Both Sir James Wilson and Broomhall, therefore, rightly estimated that there would be a net increase in imports of wheat into these countries, and again the errors in estimating imports of these countries were relatively small.

For 1923–24 both authorities estimated that in each country of Group A the decline in imports would be less than the increase in production. Again, however, the allowance was insufficient, for both authorities underestimated the decrease in imports for Group A as a whole. Broomhall's estimates were more accurate than those of Sir James Wilson. In fact, the error in Broomhall's estimates for Group A in 1923–24 was smaller than for Group B, although for Group B both authorities underestimated the change, whereas for Group A they overestimated it.

CONCLUSION

The foregoing discussion brings out clearly the special variability of consumption of wheat in the importing countries of Europe which are also large producers, and a tendency of consumption to vary with production in these countries,[2] so that wheat imports cannot be assumed to compensate for variations in wheat crops. It shows also that these tendencies are less

[1] "The world wheat crop of 1923–24 was far the largest since the war, and equal to all but the best pre-war crops. Indeed, if one excludes Russia or even Russian domestic consumption, the crop was the largest ever harvested. Good crops were general, and, on the whole the wheat was of high quality." WHEAT STUDIES, December 1924, p. 1.

[2] The same is also true of the Danube countries which are normally wheat exporters, and indeed the United States; in all of these countries exports constitute a small proportion of the total crop. Canada, Argentina, and Australia, on the other hand, normally export more than they utilize at home, and their domestic utilization shows slight tendency to vary with production.

apparent in countries which produce much less wheat than they import. It suggests that authoritative estimates of imports have erred in giving too little weight to the tendency of consumption to vary with production. These facts have no small bearing upon estimates of European wheat-import requirements for the coming year, when generally larger crops than those of 1924 are expected in Europe.

This issue is substantially the work of W. Blair Stewart.

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VOL. I, NO. 8 STANFORD UNIVERSITY, CALIFORNIA JULY 1925

CANADA AS A PRODUCER AND EXPORTER OF WHEAT

I. INTRODUCTION

As a wheat producer, Canada ranks with British India and above all other nations except the United States. She produces about 10 per cent of the world wheat crop—as much as Argentina and Australia combined. Wheat is far and away Canada's principal grain crop. On an average, two-thirds of her crop is exported, and wheat and flour make up nearly one-third of her total exports. As a wheat exporter, Canada rivals the United States for first place, and exports more than both Argentina and Australia combined. And she bids fair in the near future to outrank even the United States.

Introduction
Physiographic Conditions
Agricultural Practices
Development of Transportation
Development of Marketing
Progress of Settlement and Wheat Production
Some Economic Aspects of Farming
Canadian Wheat, Farm to Market
Canada's Wheat in World Markets
Future of Canadian Production and Exports

Canada's rise to importance as a wheat exporter has come entirely within the last thirty years, and she has attained leader's rank only within the last ten. Until 1897–98 her exports never materially exceeded 10 million bushels a year, a negligible fraction of the world's wheat trade. In the five pre-war years they averaged about 100 million bushels. In the past five years her average yearly exports have been some 230 million bushels, 32 per cent of all wheat entering into international trade. In 1923–24 they reached the huge total of 348 million bushels.

Since the war, wheat acreage, production, and exports have tended downward in the United States, and the increase of Canadian wheat crops (to 1924) has been the leading factor in maintaining exportable supplies of wheat at a high level. This high level, in turn, has constituted a major influence in keeping world prices, until the midsummer recovery of 1924, at a level generally unremunerative to producers.

The wheat crop of Canada varies enormously from year to year. To take an extreme example: in 1923 a record crop of 474 million bushels was harvested, while in 1924 the crop amounted to only 262 million bushels. Since domestic utilization is fairly constant, at 100 to 120 million bushels a year, the export surplus varies enormously. This variation tends to produce variations in wheat prices from one year to another, not only in Canada but also in the world's markets. The larger the relative importance of Canadian wheat in world trade, the stronger this tendency will become. The size of the Canadian crop and the prospective volume of exports from Canada constitute perhaps the most important single factor in the wheat markets of the world.

Canada's high position in the world's wheat trade is entirely due to the rapid development of wheat culture on the west-

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ern prairies, in the provinces of Manitoba, Saskatchewan, and Alberta, principally since the beginning of the twentieth century. These provinces produce some 95 per cent of Canada's wheat crop and almost the whole of her wheat exports. The natural conditions there prevailing make possible the production of large quantities of wheat of high quality, and the main difficulties due to geographic isolation and vicissitudes of climate have been overcome by the development of transportation and the accomplishments of agricultural research. Over 20 million acres in these provinces are sown to wheat each year, and another 10 million acres of fallow land are culti-

CHART I A.—WHEAT CROPS OF LEADING PRODUCERS, AVERAGE, 1920–24*

(Million bushels)

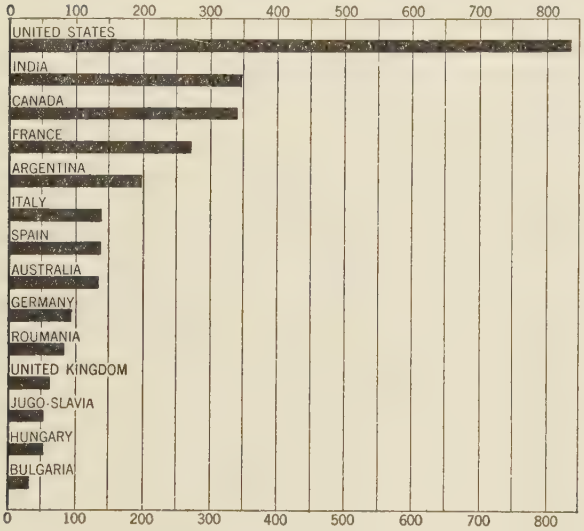


CHART I B.—NET EXPORTS OF WHEAT AND FLOUR BY FIVE LEADING EXPORTERS, 1920–25*

(Million bushels)

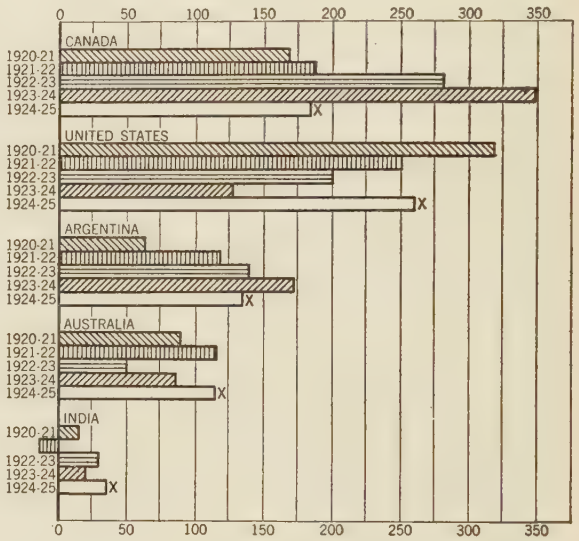


CHART I C.—WHEAT PRODUCTION IN WESTERN CANADA AND CANADIAN WHEAT AND FLOUR EXPORTS, 1898–1924*

(Million bushels)

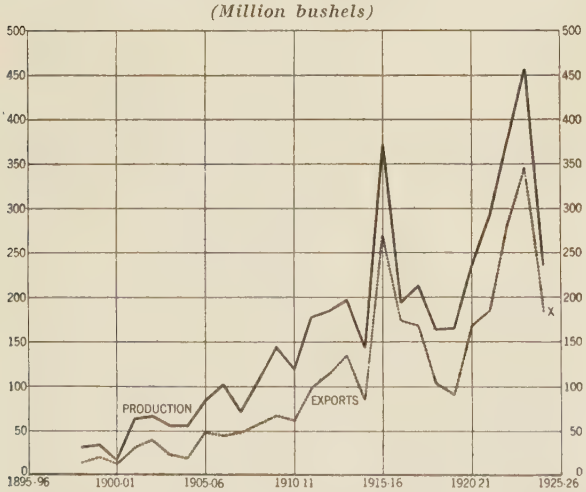
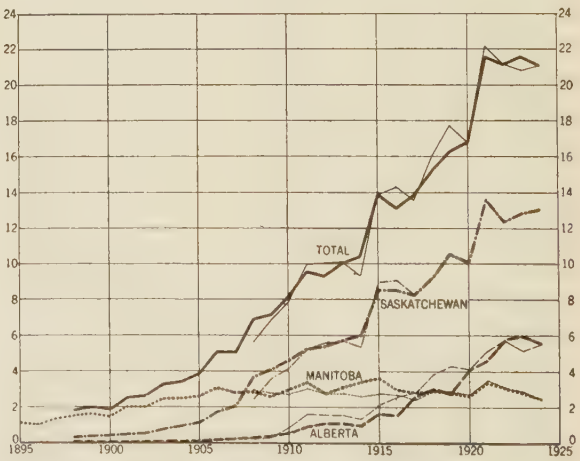


CHART I D.—WHEAT ACREAGE IN PRAIRIE PROVINCES, 1898–1924* a

(Million acres)



* Sources: *Foreign Crops and Markets;* and see Appendix Tables I, II, XIV, XVI, XVII, XXIII.
a The heavy lines show the Provincial estimates of acreage, the light lines the Dominion estimates.
X Preliminary approximation.

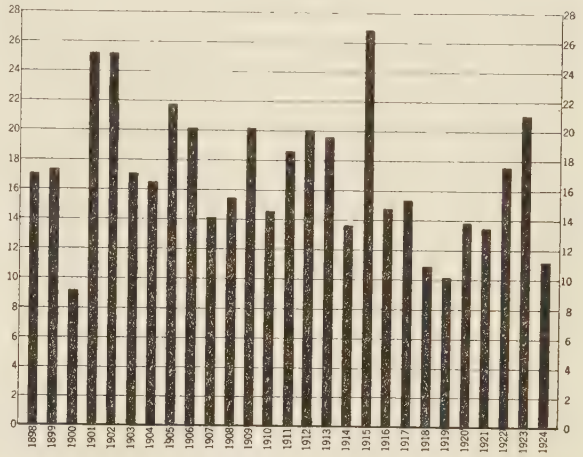
vated every summer, mainly to be sown to wheat the following spring. It is a general belief in Canada that millions of acres more are potentially available for wheat culture in the prairie provinces, and constitute the world's principal reserve of uncultivated wheat lands.

These broad facts clearly justify a study of the conditions under which Canada has achieved her present eminence as a producer and exporter of wheat. There is also a question of the future. Will the expansion continue in the next few years? If so, how far will it go, and by what way? These are questions of large concern to the world in general and to wheat farmers and the wheat trade in particular. While no clear-cut answers can be confidently given, the basis for answers can be supplied by a careful study of the rise of Canada as a producer and exporter of wheat, and of the present conditions underlying her production and exportation.

The present paper embodies the results of such a study. In particular it deals with basic physical conditions in the prairie provinces of Western Canada, with their progress in settlement, agriculture, and transportation, and with the current practices as to wheat production and marketing in Canada. It concludes with a summary of the influences bearing upon the outlook for the future.

CHART 2.—AVERAGE YIELD PER ACRE OF WHEAT IN PRAIRIE PROVINCES, 1898–1924*

(Bushels)



* Sources: See Appendix Table XIV (Provincial estimates).

II. PHYSIOGRAPHIC CONDITIONS OF WESTERN CANADA

The physiographic characteristics of Western Canada underlie its past, present, and future development as a wheat producer. They largely account for the delay in opening up the country, for the transportation problems encountered, for the choice of wheat varieties and the agricultural practices employed, and for the characteristic variations in yield from year to year.[1]

ISOLATION OF WESTERN CANADA

The tardy development of Western Canada is largely explained by its geographical position—its physical isolation, on the one hand, and the political separation of Canada and the United States on the other.

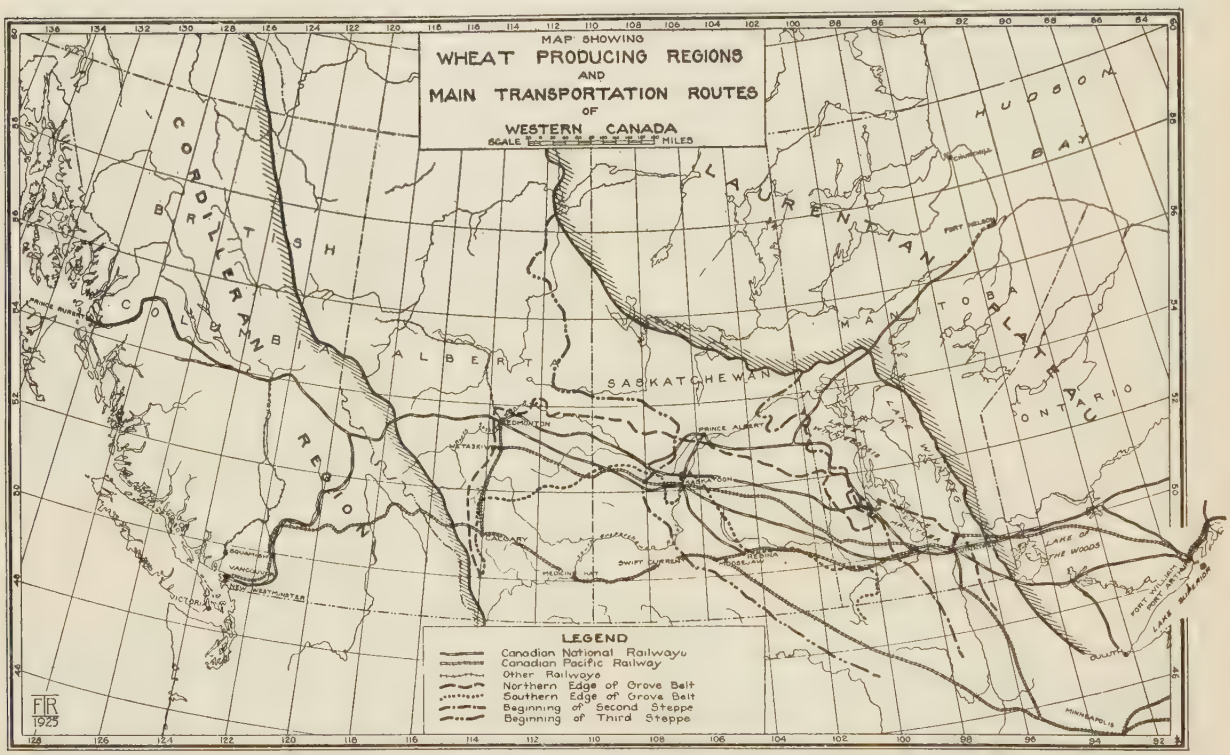
Ontario itself lies inland, far removed from the Atlantic Ocean, and between the nearest habitable districts of Ontario and Manitoba extends a wilderness of rock, wood, and water, a thousand miles across, quite unfitted for close settlement. This barrier can be avoided for the greater part of its distance by following up the waterway of the Great Lakes from Ontario to the twin port of Fort William and Port Arthur, situated on Thunder Bay, on the northwest shore of Lake Superior. Even so, there remains a journey of about four hundred miles by land across the wilderness before the plainlands suitable for agricultural settlement are reached. Again, at the western limit of these plains, the Cordilleran mountain system raises another obstacle, four or five hundred miles in width, to prevent easy communication with the Pacific Ocean and its shores.[2] The history of wheat-growing in Western Canada is in no small measure a history of the successive steps by which improvements in transpor-

[1] For general references, see Bibliographical Notes, p. 273.

[2] See map, p. 220.

tation have conquered these barriers to east and west and in particular the ones between the prairie provinces and the Atlantic.

On the southern boundary there are no formidable physical obstructions, and the Great Plains of the American West run northward into Canada. The only natural mark of separation is a watershed on the third steppe, a low ridge that can easily be crossed by man or beast. Nevertheless, the frontier between Canada and the United States is a hindrance to commerce more effective than the wilderness in the east or the mountains to the west. Climate is similar on the two sides of the border, speech and customs are the same, the same kinds of crops are raised by the same kinds of men. But political separation and national policies have restricted free movement of goods and men, have altered the development of rail and water routes, and have thus retarded and modified the progress of this great agricultural area.



to give opportunity for agricultural exploitation on a very extensive scale, and climatic and economic factors have so far determined that the principal product shall be wheat.

From east to west the plains rise toward the Rocky Mountains in three stages, commonly termed steppes. The most easterly is the Red River Valley. The floor of this valley is about seventy-five miles in width. It lies 750 or 800 feet above sea level and is as flat as a board. Its soils are clays and silts deposited in the bed of a lake of earlier times, and are splendidly suited to the plow.

A sudden change of level occurs at the western edge of the Red River Valley, where the ground rises sharply in a continuous escarpment, with also several disconnected

Relief and Soils

The agricultural lands of Manitoba, Saskatchewan, and Alberta are a small northern portion of the "Great Plains" of North America. From east to west they are seven or eight hundred miles in length and they extend northward from the international boundary for two or three hundred miles. The comparatively level surface of these lands, the quality of their soil, the large areas of grassland, and the absence of a forest cover are advantages which combine

ranges of hills. This is the edge of the second steppe (see map) and beyond it lies the second steppe itself, the true "great plains" of the west, at about 1,600 feet above sea level. The general surface of these plains is gently rolling, although there rise in several places ridges and low hills. The rivers and streams run well below the level of the surrounding country in broad flat-bottomed valleys with steeply-sloping sides, so that they constitute obstacles difficult for roads and railways to cross. The soils are largely glacial in origin, and are of varied character, in general of excellent quality for agriculture.

A second escarpment, known as the Missouri Coteau, runs in a northwesterly direction from North Dakota across the southwestern portion of Saskatchewan and onward with less defined features into central and northern Alberta. This is the edge of the third steppe, and behind it there lies another stretch of prairies, at a level of 2,500 feet or more above the sea and extending to the foothills of the Rockies. This region contains the driest parts of the prairies, and in the early days of western exploration was regarded as desert. Its streams are feeble and intermittent in their flow and often drain into small salt- or fresh-water lakes without outlet. Its soils are of much more varied quality than those of the first and second steppes, and some of them are unfitted for agriculture by alkali or other evils of a dry climate. On the other hand, irrigation is possible over large areas in this region by reason of the water supplies of rivers flowing from the snowfields of the Rocky Mountains.

Climate

The climate of Western Canada is of the "continental" type, which is characterized by a predominant summer rainfall and a wide range of temperature between summer and winter. The temperatures of wintertime are so severely low that the ground is frozen hard to a depth of several feet, and work on the land becomes impossible. The agricultural season is sharply defined in its beginning by the melting of the winter's accumulation of snow in March and April, and in its end by the freezing of the soil at the return of winter, usually in November. The first snow-covering forms as a rule only after the soil has thus been frozen hard. It does not lie thickly, and in the west and southwest it may even be removed from time to time during the winter by warm dry "Chinook" winds that descend on the prairies from the Rocky Mountains.

The precipitation (rain and snow) of the three provinces is everywhere rather low for agriculture. Only in a very few places does it average more than 19 inches, and over large parts of the settled area of Saskatchewan and Alberta it is less than 15 inches. About 60 per cent of the whole falls in the five summer months from April to August, the growing season of the crops, the two rainiest months of the year being June and July. Combined with this summer rainfall there is usually a sufficiency of warm and sunny long summer days to ripen all kinds of quickly-growing crops.

Table 1.—Precipitation in Manitoba, Saskatchewan, and Alberta*

(Inches)

Place	Elevation *(feet)*	April to August: First quartile [a]	April to August: Median	April to August: Third quartile [a]	Annual average
Manitoba					
Winnipeg	766	10.60	12.34	14.76	21.07
Minnedosa	1,675	8.06	10.69	12.29	16.92
Saskatchewan					
Qu' Appelle	2,132	10.14	11.74	14.57	18.35
Prince Albert	1,414	7.38	9.71	11.90	15.72
Alberta					
Medicine Hat	2,181	6.42	8.11	9.69	13.03
Calgary	3,437	7.68	10.47	13.83	16.12
Edmonton	2,183	9.59	10.53	15.16	17.42

* *The Temperature and Precipitation of Alberta, Saskatchewan, and Manitoba*, Meteorological Service of Canada, 1920. Based upon figures for 33 years or more, ending 1917.

[a] When the figures of a sequence are arranged in order of size, the middle of the lower half is the first quartile, the middle term of the whole sequence is the second quartile or "median," and the middle term of the upper half the third quartile. Half the terms therefore fall between first and third quartiles.

The rainfall, since it is rather low for agriculture, exerts a strong control over the size of crops, and its variations from place to place and from year to year are of great economic importance. Table 1 indicates the general character of both kinds of variations. In the main, both rainfall and snowfall are less in the western than in the east-

ern districts, being least around Medicine Hat in southeastern Alberta. This district, indeed in general all the southern portion of the third steppe, is the most liable to crop failure in years of scanty rainfall.

High latitudes, a high altitude, and a northern exposure are influences which make for cold nights during the growing season and for occasional frosts in late spring and in early fall. Such a chance frost in May or early June may set back the growing crop or may kill it outright. But the early fall frost is more widely dreaded because it may do great damage to the wheat crop by spoiling the milling qualities of the grain and the commercial baking qualities of the flour. For successful wheat-growing, therefore, it is necessary to employ varieties which are likely to ripen before the coming of the first destructive autumn frost. On the other hand, the growing of corn (maize) for its grain[1] is not often successful, except in the southern parts of the provinces, because in general no variety can come to maturity before it is killed by the first autumn frosts.

A special map of considerable interest has recently been published[2] to show the average length of the growing season (of wheat) in the agricultural districts of the three provinces. For this purpose, the average length of the growing season is defined as the number of days between the average date of seeding (of wheat) and the average date of the first autumn frost. The length of the growing season varies considerably from year to year; and even the averages may be influenced unduly by extreme variations in exceptional years. It is also doubtful whether for many places sufficient data exist to allow of the computation of reliable averages. Yet the results presented by the map are interesting and suggestive, even if not entirely conclusive. The following figures for a few places indicate broadly the variations in length of the average growing season shown by the special map:

Minnedosa, Manitoba	128 days
Winnipeg, Manitoba	145 days
Prince Albert, Saskatchewan	114 days
Qu'Appelle, Saskatchewan	130 days
Edmonton, Alberta	140 days
Calgary, Alberta	141 days

Broadly speaking, and as might be expected, the growing season for wheat is shorter in the more northerly districts and and at the higher altitudes. It is also ten days or more shorter in Saskatchewan, the principal wheat-growing province, than in Alberta or Manitoba.[3]

Vegetation

The regions in which agricultural settlement has taken place are by no means all bare grasslands, though such lands of course constitute a large part of the whole. Many of the most esteemed lands lie in the "Grove Belt" or "Park Country," where the open grassland is freely interspersed with groves of bush. The northern and southern edges of this belt are shown on the map, so that it can be followed from southern Manitoba across central Saskatchewan and Alberta as a strip of country from 50 to 125 miles wide. It constitutes a zone of transition between bald "prairie" grassland to the south and continuous bush-country to the north. Into the northern bush country and the still more northerly sub-arctic forest beyond it, general settlement has yet made but little way, so that for the present the northern outskirts of the Grove Belt mark the northern borderland of agricultural development in the Canadian West.

The general character of the vegetation is determined by rainfall and temperature. In the hottest and driest part of the prairies —the "Chinook" region on the southern portion of the third steppe — there are places where sagebrush, cactus, and other xerophytic[4] plants are found; but elsewhere on the upland the native grasses provide splendid pasture and natural hay on which beef cattle may be left to graze all the year round.

The prairie grasslands of the second steppe enjoy more rainfall and are there-

[1] Corn is grown for silage with great success.

[2] *Physical and Climatic Map of Manitoba, Saskatchewan, and Alberta,* Natural Resources Intelligence Service, preliminary edition, 1924.

[3] See also Appendix Table XXI for dates of seeding and harvesting in Saskatchewan.

[4] Plants adapted to the conditions prevailing in regions of low rainfall and high evaporation.

fore more fertile, so that here wheat growing is most firmly established at the present time. Trees and bushes are now being extensively planted and grown, and the protection they will afford to crops and stock is certain to exert a considerable influence upon the agricultural prospects of these grasslands.

The cooler climate of the Grove Belt favors the growth of bush, and this land is therefore well suited to mixed farming, the cattle ranging in the groves, the crops growing on the plowed grassland. It is no great disadvantage here, perhaps, that the growing season is rather short for the standard varieties of wheat, because the keeping of livestock requires the growing of forage crops and of coarse grains, such as oats, which are better adapted than wheat to the asperities of the climate.

III. AGRICULTURAL PRACTICES IN WESTERN CANADA

The climatic limitations of a scanty rainfall and a short growing season exert a most powerful influence upon methods of soil cultivation and the selection of suitable crops and varieties.[1] In general, the deficiencies of rainfall are felt more severely in the south and southwest, and the shortness of the growing season in the north; yet both influences are strong over the whole area of cultivation.

The Cultivation of the Soil

Because the rainfall of the growing season is often not sufficient to insure a satisfactory yield of wheat, it is necessary to employ cultural practices that will accumulate water in the soil, for the benefit of a subsequent crop, from the rain and snow which fall during other seasons. Of these practices, much the most important is the fallow, in accordance with which the ground is plowed and worked during a summer season, to be planted to a crop in the following spring. At the present time between 40 and 50 per cent of the wheat acreage of Western Canada is land that was thus fallowed the year before.[2]

Prairie farming has had to begin with the breaking of prairie sod—to destroy natural vegetation, to make a good seedbed, and to accumulate moisture for the first crop. Such breaking is best done by a shallow plowing, early in the season, so that the summer rains may soak into the soil. Sometimes an early breaking may be sown to wheat, but the risk of failure is great, and the ground is usually left bare so that the turned sod may rot. Later in the season it is worked over again, most commonly by a second deeper plowing—"backsetting"—to break up the sod into clods and kill persistent native plants. The frost of winter crumbles the clods to smaller pieces, and when the spring thaw comes some of the melted snow soaks into the newly-made soil, further increasing its store of moisture. The broken land then lies ready for its first crop of wheat.[3]

After a very small number of crops, the yields from newly-broken land decline to an unprofitable level, through the drying of the soil and the coming of weeds. When it has reached this condition, a summer-fallowing becomes necessary. Land to be left fallow during the summer is, or should be, plowed as early as possible after the stress of spring seeding is past. Afterward it must be worked over several times in the rainy season, in order to keep down weeds, which grow in abundance on fallow land, and to maintain a loose surface layer, which lets the rain pass through and shields the moisture-retaining underlayers from the heat of the sun.[4] Without these later

[1] For general references, see Bibliographical Notes, p. 273.

[2] See Appendix Table XV.

[3] The new settler in times past has often followed a different plan, plowing deeper and until much later in the season, in order to break as much ground as possible. His first crops, which might be sown on the newly-broken land, were usually oats and potatoes, for subsistence, or flax, for its seed, as a cash crop.

[4] Recent experiments at the Experimental Station of Swift Current, Saskatchewan, tend to the conclusion that, in the drier regions, at least, the loose surface "mulch" is of little or no value in checking evaporation from the soil, and that the principal advantage of early plowing and repeated cultivation lies in the destruction of weeds. (*Seasonable Hints*, Dominion Experimental Farms, March 1925.)

workings, the benefits of the first plowing are largely lost.

The summer-fallow thus gains a definite place in the grain-growers' rotation. In the drier parts of the prairies this rotation may be wheat and fallow in alternate years, but more commonly it comprises two years of wheat to one of fallow. In such cases the crop of the first year gives better and surer yields than the crop of the second year—the "stubble" crop. Where there is too much risk of loss from a second or third consecutive crop of wheat, the crop rotation is often extended by a coarse grain crop, usually oats, in the year before the fallow. In years of late spring, established rotations may be broken, and land that might otherwise have been planted to wheat will then be fallowed, or planted to oats or barley instead.

Unfortunately the summer-fallow is not without serious faults. Crops grown on fallowed land enjoy the moisture of the soil too well; the straw grows longer and weaker, the grain ripens later, and the crop may lodge in a high wind or suffer damage from an early frost. Continued for many years, summer-fallowing also lowers the quality of the soil. Soil fibre is destroyed and organic matter and nitrogen are washed out. Finally, when the soil has thus been broken down to barren dust, as the result of overcropping or overworking, it drifts away in the wind, causing loss to the lands it leaves and to those on which it settles. This evil has so far been felt principally in the south and southwest, and is likely to spread further.

Practicable alternatives for the summer-fallow are urgently required. In the more humid parts of the west, at least, it can be replaced by an intertilled crop, such as corn, potatoes, or sunflowers. The ground is well cleaned of weeds by the cultivation given to the crop,[1] and the succeeding grain crop is likely to yield as well as if it had been grown on fallowed land, or to do even better. These technical advantages are counterbalanced at the present time by the economic disadvantage that in general there is little opportunity in the west to dispose of corn, potatoes, or sunflowers to the growers' advantage. A more promising alternative, which is still in the earliest stages of trial, consists of strip cultivation. Two or three rows of seed are drilled into the soil at the ordinary interval, and strips of bare ground, two or three feet wide, are left between the seeded ground and cultivated at intervals during the growing season.

[1] Provided the cultivation is really given, which is too commonly not the case.

[2] See p. 228 for further information on rust.

The Canadian Wheat Plant

The growing of winter wheat is a very hazardous procedure in Western Canada, because the plant is so much exposed to frosts, which may attack it and kill it in the late autumn before the first snowfall; during the winter, if the snow-covering of the ground should be removed for a time; or, still more serious, during the spring, after the snow has finally melted and the plant has begun its summer growth. Winter wheats are therefore grown but little at the present time, except in a few places and by a few experimenters. Spring-wheat varieties must needs be used, even though they ripen later and thus incur risk of damage by frost at the end of the growing season.

The two principal dangers to the growing wheat crop are frost and rust, each of which can spoil the grain badly in the qualities which give it value to the miller and baker. Rust is the commoner danger of the more humid portions of the wheat belt, Manitoba and eastern Saskatchewan; while frost is a more serious danger in the more northerly districts. Both troubles are alike in that, as a rule, they menace the crop only near the end of its growing season[2] and that, though they may badly damage a crop that is nearly ripe and still rather moist, they can do little or no harm to a crop that is fully mature and properly dry. As a principal means of reducing these risks, quickly-maturing varieties are employed. Up to the present only two varieties —Red Fife and Marquis—have met this requirement and given satisfactory yields of grain of good quality. Many other varieties have been tried, some with considerable success in special circumstances, and many more are in process of trial; but none has

yet attained to the general esteem in which Red Fife and Marquis are held.

Red Fife is the descendant of a Galician wheat first grown in North America in 1842 by an Ontario farmer, David Fife. Later it passed into the American West and Northwest, where it proved its great value, and thence it was introduced on a commercial scale into Manitoba in 1882 and 1883. It is characterized by a hard grain and a reddish bran and is notable for the high quality and strength of the flour it gives. The great fault to be found with it is that it is not a sufficiently early variety. This is a special drawback when it is grown on land that has lain fallow the summer before, because, like other varieties, it then ripens more slowly. It yields a long and fairly stiff straw, which is an advantage wherever such straw can be put to use, but which also involves the dangers of lodging in bad weather and of consequent difficulties in harvesting.

These defects of Red Fife wheat in Western Canada were soon revealed, and the Dominion Experimental Farms were assigned the task of discovering some still more suitable variety. After many failures and partial successes, a satisfactory result was reached at last in 1903, with the discovery of Marquis wheat, the descendant of an early cross between Red Fife and an Indian wheat.[1] By 1911, the new variety was commercially established in the West. It has since become the recognized standard wheat of Western Canada, yielding probably nine-tenths of the total crop, and has also gained a position of high esteem in many other wheat-growing countries all over the world.

The first great merit of Marquis wheat showed itself in its early trials in the West, when it gave considerably higher yields than Red Fife grown under the same conditions. It complied with the fashions of the grain trade, which require that wheat from Western Canada shall be clothed in a red coat, and it yielded a white flour of high baking quality, fully the equal of flour from Red Fife.

[1] This variety was developed by Dr. Charles Saunders, Dominion Cerealist from 1903 to 1922.

[2] A. W. Alcock, "The Milling and Baking Qualities of the Wheats of Western Canada," *Northwestern Miller*, March 25, 1925.

The best quality of Marquis wheat as a plant is its early ripening, so that it is often ripe and safe from frost and rust before these dangers can threaten. This is of special advantage in the fallow crop. The straw is shorter and stiffer than that of Red Fife and therefore less likely to lodge, but it may be inconveniently short in dry years and dry areas. For such reasons Red Fife is still preferable to Marquis in some districts of low rainfall where the soil is light. The grain of Marquis is held tightly in the ear, so that it does not tend to shell out, as Red Fife may do, in high winds and before harvest. This tight hold calls for the use of greater power in threshing and may cause some loss in years of low yield when the threshing machine is not able to handle the scanty straw to advantage and extract all the grain. It also leads to greater loss through broken grain.

Regardless of variety, the quality of wheat varies from one part of Western Canada to another. A special map of the three provinces, based upon the analyses of a cereal chemist, shows that in general the wheat from the southern and southwestern districts contains the highest proportion of protein.[2] Associated with the high protein content is a hard vitreous grain and a flour of the best baking quality. The dry regions of the west and southwest, therefore, produce the highest qualities of Canadian wheat, although, on account of the uncertain rainfall, their output is very irregular. The more humid regions northward and eastward grow a wheat of lower protein content, which may have a piebald and starchy appearance (known in the United States as "yellow berry") and which gives a weaker flour. Yet the quality of wheat from these regions is reported to improve after some years of cultivation, and the improvement is attributed to a gradual reduction in the moisture content of the soil.

In the more northerly regions, where there is more risk of early fall frosts, which in some years do serious damage to the wheat crop, early ripening is much to be desired. This can be achieved in two ways: First, the wheat can be grown in a dryish soil, so that the earlier stages of its (vegetative) growth may be hastened and the

time of its ripening (reproductive growth) brought forward. Secondly, varieties ripening more quickly may be substituted, because Marquis, though it ripens before Red Fife, is not a sufficiently early variety to be grown without risk in the more northerly districts.

In order that the soil in which the wheat is sown shall not be too moist, some modification is made in the ordinary rotation or in farming practices. Summer-fallow is resorted to less frequently, and plowing is later or shallower. A thinly-sown pasture crop may be raised on the fallow, or a coarse grain—usually oats—may take precedence in the rotation as the first crop after the fallowing, wheat being sown the next year as a stubble crop. In either of these last two practices the principle is the same, that of making some other crop draw off any excess of moisture in the soil before the wheat is sown. The fortunes of the wheat crop will thus depend principally upon the fall of rain during its growing season. On the whole, over a number of years, the yield will be smaller than in the more southerly regions; but any such loss of yield is good insurance to be paid for earlier ripening and consequent safety from the first frost of autumn.

Several varieties of early-ripening wheat have been developed by the Dominion Experimental Farms for use in the more northerly districts. Two varieties of importance are Prelude and Ruby, which ripen about a week before Marquis, but do not yield so well. Apparently also they do not give such good flour, although on this point millers and bakers have not yet given their final verdict. Quite recently, too, the Dominion Cerealist has announced the preliminary results of tests on another new variety of wheat, named Garnet, developed by his branch of the Experimental Farms. It ripens about eleven or twelve days earlier than Marquis on the average, and under very dry conditions seems able to thrive with greater success than Marquis. It is also a good yielder. Its commercial qualities for milling and baking have not yet been definitely determined. Possibly it will replace Ruby, and may enjoy even greater success in the further course of time.

From Seedtime to Harvest

With the melting of the winter's snows in March and April, some of the water runs off the land, causing freshets and floods, and some soaks into the soil. This soaking-in is one of the important sources of soil moisture in Western Canada, and the careful farmer aims to work his land in ways that will secure its benefit to the full. When the ground has dried sufficiently, plowing and seeding can proceed, in April and May.

In the spring the wheat farmer makes his important decisions of the year. Within the limits set by his rotations and by the weather and soil conditions, he must decide how much of his land he shall put into crops, how much he shall leave fallow, and how much grassland he shall break. For the wheat land to be seeded, he must choose among plowing, cultivating by discs or harrows, and drilling his seed into the stubble of the last year's crop. The relative advantages vary with the moisture content of the soil and the prevalence of weeds, so that the choice is often a matter of great complexity.

Quality of seed has been the subject of much careful attention. Many farmers take pains to plant selected seed of uniform variety and good germination, well cleaned of weed seeds—either by selection from their own crop or by purchase from dealers or others who specialize in the production of high-grade seed. The prevalence of this practice made possible the rapid spread of Marquis wheat and may facilitate further desirable substitutions. But these sound practices are by no means universal, and the majority of farmers use their own grain for seed or buy in the neighborhood. Some clean the grain from weed seeds by a fanning mill and treat the seed with hot water, formaldehyde, or copper sulphate to destroy the spores of smut. Nevertheless, it is commonly complained that these preparations are not carried out with sufficient thoroughness and that the spread of weeds and smut is facilitated by the carelessness of farmers with respect to seed grain.

The time of seeding is a matter of great importance. If sown too soon, the seed grain may rot in the earth before germinat-

ing, or the young plant may be killed or injured by a spring frost; if sown too late, the crop will be late in ripening and may be damaged in the autumn by rust or frost. Because of its long growing period, wheat is always the first crop to be sown, usually during the second half of April and the first part of May, but earlier or later in exceptional years.[1] When seeding is held back by a late spring, less wheat will be sown, and the farmers will plant instead a larger acreage to oats or barley, more quickly-growing crops.

Some farmers harrow the growing crop in its early stages in order to remove weeds and loosen the surface, but the majority let it alone from seeding to harvest while they proceed to work their summer-fallow and make their hay. As soon as the grain is ripe, but not too ripe, it must be cut quickly, to avoid loss by shattering. The bound sheaves are set up into "stooks" (shocks), where they cure gradually, protected from damage by rain. For the harvest, thousands of harvest hands from Eastern Canada are brought in by special trains at cheap rates and distributed to the harvest districts by the railway companies and the provincial governments' employment agencies. The skilled men drive reaping and threshing machines, the unskilled handle sheaves. All are worked as hard as possible, because the crop must be harvested quickly and because the farmer finds his wage bill a heavy burden.

The header-thresher is unsuited to the climatic conditions of Western Canada, because it will operate successfully only when the grain is fully ripe. The Canadian farmer does not dare to await that stage, and therefore uses the reaper-binder instead, even though the costs of harvesting and threshing are considerably increased. Horses are generally used for reaping and for all other draft work on the farm. Only in a few operations has the tractor proved capable of offering effective competition. The principal use of mechanical power at the present time is in threshing, for which straw-burning steam engines are most commonly employed. Powerful machinery is required for this work in order to effect a thorough and profitable separation of the grain from the ear. The work is done by threshing gangs, who move from one farm to another with their equipment.

Where no use can be found for the threshed straw, it is commonly burnt in heaps where it lies. This practice, like that of the summer-fallow, leads in the end to a deterioration of soil fertility. Yet in the comparative absence of livestock on farms in Western Canada, it has been hard to discover any better alternative, because, even in a much more humid climate, the straw could not be turned back into the soil with advantage. For the future, however, it is possible that the new process for the production of artificial manure from waste straw[2] will become a recognized farming practice, wherever the farmers themselves are willing to make the manure and apply it to their land.

After the rush of harvesting is past, the next task of the farmer is to begin plowing his land for the next year's crop. Fall plowing may sometimes be less profitable than spring plowing, but it is done, nevertheless, because there is not nearly enough time to do all the necessary plowing in the following spring, and because in any case the yield on autumn-plowed land is regularly better than the yield on land upon which the seed was drilled into stubble. Some of the harvest hands usually stay behind to help in this work, which goes on until the soil freezes for the winter. No very large part of the land can thus be worked before freeze-up and the greater part must be left till the following spring.[3] During the winter, the grain-grower can do no work on his crops or his land, so that he must wait with little occupation until he can go out to his fields again and face the same problems of choice that he considered twelve months before.

Farming Difficulties

Though the normal conditions of soil and climate in Western Canada are well suited to the production of wheat of high quality, there are many hindrances to successful

[1] See Appendix Table XXI.

[2] H. B. Hutchinson and E. H. Richards, "Artificial Farmyard Manure," *Journal of the Ministry of Agriculture,* London, August 1921.

[3] Some statistics on fall and spring plowing are given in Appendix Table XV.

cultivation. Some of these are largely or wholly unpreventable, others can be in great measure overcome by the employment of proper means.

The evil of frost has already been considered, and the various expedients used to combat it by securing early ripening have been indicated. The climatic disorder of the greatest severity is probably that of a hot dry summer, in which the soil is not able to provide sufficient moisture for the needs of the plant and the grain does not fill out. In such years only fallow crops give satisfactory returns and the yields from the stubble crops are pitifully low. Since more than half the wheat must be grown as a stubble crop, the farmer cannot guard against such a mischance as this, beyond adhering carefully to the recognized principles of good husbandry.

One of the worst disasters that can befall a farmer is a hailstorm, which may damage or destroy a growing crop almost in a moment. Fortunately for the West, hailstorms are always local and are not likely to occur in many places during the summer, so that while they cause heavy loss in a few places they do not noticeably reduce the size of the western crop, and the farmer can insure himself against serious financial loss from hail.

Another set of difficulties is presented by the prevalence of weeds of all kinds. The damage done by weeds each year, in stealing soil moisture, reducing yields, and contaminating threshed grain, is estimated in millions of dollars, and is still increasing. The spread of weeds is attributed to the use of badly cleaned seed and to poor methods of farming. The most effective remedies are to be found in the development of mixed farming, improved rotations, the keeping of livestock, and better methods of working the soil. All the provincial governments have passed laws and established organizations to enforce the destruction of weeds, but the measures have not received consistent support from individuals and communities. The decline of Canadian yields over a long period of years since the earlier days of cultivation, is probably attributable in large part to the ravages of weeds. Unless some remedy is applied, it is possible that this decline will proceed still further.

Of several menacing plant diseases, rust has already been mentioned as a regular danger to wheat at the end of the growing season.[1] In years of high rainfall and little wind it is also an acute danger much earlier in the season, because it may attack the growing plant and prevent the head from forming. This of course means complete crop failure. It is, on the whole, unpreventable, but it can be countered by the use of early ripening varieties, rust-resisting varieties such as durum wheats, practices which encourage early ripening, and the destruction of certain plants, such as the barberry bush, which are hosts to the rust spores in certain stages of its life cycle. There are two principal kinds of wheat smut, loose and covered. Both can be prevented if the hot-water treatment of seed is used. In practice, however, this is a very difficult treatment which the ordinary producer is hardly able to furnish, and he employs instead the treatment by formaldehyde or copper sulphate, which gives protection against covered smut alone. On the majority of farms, therefore, there is always some risk of loss from loose smut.

Of insect pests, it is possible here merely to list a few. Caterpillars of many kinds—commonly termed cutworms—devour the growing crops. Their attacks are most common in June, but may develop at other times, according to the particular species at work. Grasshoppers constitute another pest, devouring the crop and causing serious damage in certain years. Other insects, such as the sawfly, attack the stems of wheat at the end of its growing season and cause it to fall.

Methods of protection and prevention can be employed against the majority of the insect pests. Grasshopper plagues, for example, are combated by the provincial governments acting in coöperation with the municipalities and the individual farmers. Poisoned bait is prepared and distributed in large quantity, and a serious campaign is waged, with direction from a general headquarters. In the case of other pests, how-

[1] See above, p. 224.

ever, individual or, at best, local action is the more usual practice.

In conclusion, it is perhaps well to say that the most of these troubles arise from the fact that large areas of land under cultivation by the individual farmer lie side by side with land to which little or no cultivation is given and which furnishes abundant opportunity for the growth and spread of pests. They are also a consequence of the great predominance of grain crops in the rotations, which encourages the appearance of the same trouble in the same place year after year. With closer settlement, more thorough cultivation, and better rotations, their severity may decline.

IV. THE DEVELOPMENT OF TRANSPORTATION

The isolation of Western Canada by national and political barriers held back for many years the settlement of its land and the development of its agriculture. The disadvantages of this isolation have been largely overcome by the construction of a complex and highly-organized system of transportation.[1]

To the east, a continuous waterway from the St. Lawrence River to Lake Superior has been constructed, and is now maintained and operated at public expense without charge to any vessels that use it. With the evolution of a type of boat specially constructed for navigation on the Great Lakes and specially designed for the carriage of large cargoes in bulk, the waterway has become a cheap and convenient route for commerce between East and West.

To the west, where water communications fail, railway construction has supplied the deficiency. With the aid of numerous government guarantees and subsidies in land and money, several main lines and a vast network of branches have been constructed to connect the wheat-fields of the western plains with the Great Lakes. In return for the public assistance thus given, special arrangements have been made to keep freight rates on grain and certain other staple commodities at a conspicuously low level. For this reason, and because of political separation from the United States, there has always been in Canada a strong tendency to retain all routes of transportation, both by land and water, within Canadian territory and under Canadian control.

Wheat is the principal commodity shipped from the West. In order that it may be transported in the most economical manner, it is always handled in bulk, in car or boat. For this purpose, it must first be collected in numerous track elevators at country points and thence concentrated in immense terminal elevators at lake and ocean ports. The monopolistic advantages which the large railway and elevator companies possess have led to the imposition of strong control exercised through specially appointed public authorities. Shipping, however, has thus far escaped regulation of this kind because it is still conducted under much more competitive conditions.

The Eastern Waterway in the 'Eighties

The development of transportation in the region of the Great Lakes has been going on for a hundred years or more and has been strongly influenced by ceaseless competition between Montreal and New York. A brief statement of the condition of communications in the 'eighties and of the important advances of that decade may indicate the general character of the connection between West and East at the time when the commercial movement of wheat from Western Canada began.

A 16-foot waterway was established on the four upper lakes in the early 'eighties, after the opening of a 17-foot lock at the St. Mary's Rapids, between Lake Superior and Lake Michigan. The first iron bulk freighter to navigate the Lakes was built in 1882, the first steel bulk freighter in 1886. By the enlargement of the Welland Canal, a 14-foot waterway was provided between

[1] For general references, see Bibliographical Notes, p. 273.

Lake Erie and Lake Ontario. A series of short canals 9 feet deep, on the upper St. Lawrence, connected Lake Ontario with the port of Montreal. Below Montreal a ship channel in the lower St. Lawrence, dredged to a depth of 25 feet, was opened in 1882 and deepened to 27½ feet in 1889. At this latter depth it would accommodate vessels up to 6,000 tons gross. The Erie Canal, 7 feet deep, from Buffalo to the Hudson River, connected the upper lakes by water with the port of New York.

Of the numerous railway systems in the Great Lakes region at this period, particular mention must be made of the Grand Trunk Railway, whose main line ran from Chicago through Michigan and southwestern Ontario to Toronto, Montreal, and Portland, Maine. Several branch lines of this company connected Georgian Bay, on Lake Huron, with towns on the north shore of Lake Ontario.

Early Transportation in Western Canada

During the 'seventies, after the acquisition of the Canadian Northwest by the Dominion of Canada, several well-organized means of communication were established. The "Dawson Route," by road and river, from Port Arthur to Winnipeg, provided a direct connection between Lake Superior and Manitoba; and an alternative route, easier and more popular, ran from Duluth to the Red River by rail, and down the Red River to the settlements in Manitoba by boat, railway, or stage. West of Manitoba, the only means of communication throughout the thinly populated Northwest Territories were steamboat services on the Manitoba lakes and the North Saskatchewan River, and a number of beaten prairie trails, traversed by columns of carts. Movement of heavy freight was of course impossible under these conditions.

The Building of the Canadian Pacific Railway

The first transcontinental line, the Canadian Pacific Railway, was originally undertaken, in 1871, for political reasons and as a government undertaking. At the end of ten years, little construction had been accomplished. Accordingly, in 1881, the venture was transferred to a private company, which undertook to complete the line in return for a money subsidy of $25,000,000, the grant of 25 million acres of good agricultural land in the West, the title to certain parts of the line already completed or under construction, and sundry minor privileges.

Under these terms, a branch line from Winnipeg to the Minnesota boundary, which had been opened in 1879 but had proved apparently of small commercial importance, was at once transferred to the company, and building was actively undertaken. In 1883 the line from Winnipeg to Lake Superior was opened to traffic, and over it in 1884 the first shipment of grain was made to Europe. Meanwhile, construction was pushed rapidly across the prairies. In 1883 the railhead reached Calgary. In 1885 the lines through the Rockies and through the wilderness north of Lake Superior were completed and the first train ran through from Montreal to the Pacific. Five years later a line was opened across northern Maine between Montreal and St. John, N. B. Thus, by 1890, Western Canada was provided with complete railway connection for commerce with either ocean in both summer and winter.

After the first hurried completion of the main line, the C. P. R. ceased further construction and devoted its efforts to the improvement of its roadbed and the replacement of temporary by permanent structures. Additional mileage in the West was added slowly by small companies, which built branch lines as traffic feeders and surrendered them, willingly or reluctantly, to the C. P. R. for operation. In this way a small network of lines was constructed in Manitoba, both north and south of the main lines; and in the Northwest Territories, two long branches, one from Regina to Saskatoon and Prince Albert, the other from Calgary to Edmonton, provided connections with the settlements on the North Saskatchewan River.

In Manitoba and the southeastern portion of the Territories along the line of the C. P. R. and its branches, grain growing was a common type of farming and questions of

freights and prices assumed peculiar importance. There was constant dissatisfaction with the C. P. R. for maintaining rates at what was felt to be an unduly high level, and the ill-feeling became particularly acute during the severe depression of the middle 'nineties. Settlers in the northern districts tended to develop a more self-sufficient type of mixed farming, and were not so much perturbed by high freights and low prices for grain. Types of farming in all parts of the West were influenced at this time not only by the costs of railway connection with distant consuming markets but also by a general lack of roads and bridges and the consequent difficulties of local haulage.

The Advance from 1896 to 1903

With the passing of the world-wide agricultural depression, further important developments of transportation took place. In the eastern region, a 20-foot channel for navigation on the upper lakes was opened in 1897, allowing the employment of much larger and more economical vessels. At the same time the Canadian Pacific and Grand Trunk Railways first developed the important Georgian Bay routes, over which grain is hauled by rail from a Georgian Bay port direct to Montreal. The improvement of the St. Lawrence canals was pushed to completion, and in 1901 a 14-foot waterway was opened from Lake Ontario to Montreal. Below this port, between 1899 and 1906, the ship channel was dredged to a depth of 30 feet and greatly improved, so that much larger vessels, up to 15,000 tons gross, could pass Quebec at high tide and ascend the river to Montreal.

In the western region, transportation conditions were altered to the advantage of the farmer by financial and political measures. In 1897 western agitation at last evoked the famous Crow's Nest Pass agreement between the Dominion government and the C. P. R., by which the company received a Dominion subsidy on some new construction in the West and undertook in return to lower its rates on eastward grain and grain products by 3 cents a hundred pounds and on westward commodities of importance to the settler by 10 per cent.

In Manitoba, the humble beginnings of a new transcontinental system appeared in 1897 with the opening of a small colonization line, built by two railway contractors, Mackenzie and Mann. Other small lines were gradually added, and by 1902 the two projectors had built up a strong competitor to the C. P. R., the Canadian Northern Railway, with branches in all parts of Manitoba and a main line of its own to Port Arthur. The provincial government of Manitoba greatly encouraged and assisted this competitive system[1] and as a result procured from both lines in 1902 and 1903 a further reduction in grain rates of 2, 3, or 4 cents a hundred pounds from all shipping points in the West.

New Main Lines in the West

The original scheme of the Canadian Pacific Railway contemplated a line running north and west through the fertile valley of the North Saskatchewan River to Edmonton and crossing the Rockies by the easy Yellowhead Pass. In 1881 the company changed this location, partly for financial reasons and partly because enthusiastic reports had led it to take a highly favorable view of the agricultural prospects of the southwestern grasslands, the cattle district of southern Alberta. Accordingly it diverted its route through these drier lands, crossing the mountains by two more difficult passes through the Rockies and the Selkirks.

For more than twenty years thereafter, the better agricultural lands to the north were served only by the two long branch lines from Regina and Calgary, until at last the new advance of settlement from 1897 onward showed clearly that the time had come for the provision of a new main line between Winnipeg and Edmonton. Although one main line would probably have sufficed to serve this region, three were

[1] The Manitoba government, in 1888, had guaranteed securities of the Northern Pacific and Manitoba Railway for the construction of branch lines in Manitoba in return for the privilege of fixing rates. It thus secured a reduction of rates to Duluth and compelled the C. P. R. to reduce rates from competitive points to Fort William. In 1901 the lines constructed in accordance with this agreement were transferred to the Canadian Northern Railway, and the earlier agreement was renewed, with final consequences as described above.

constructed, one by each of the three big Canadian systems. Each of the two newer lines also planned to repeat the success of the C. P. R. and incorporate its prairie line in a larger system between Atlantic and Pacific ports.

The Canadian Northern was first in the field. The ambitions of its owners were made known in 1902, and their line between Winnipeg and Edmonton was opened in 1905. Construction was largely financed by bond issues guaranteed by the Dominion and provincial governments, and was further aided by land grants previously made to abandoned railway projects whose charters it acquired.

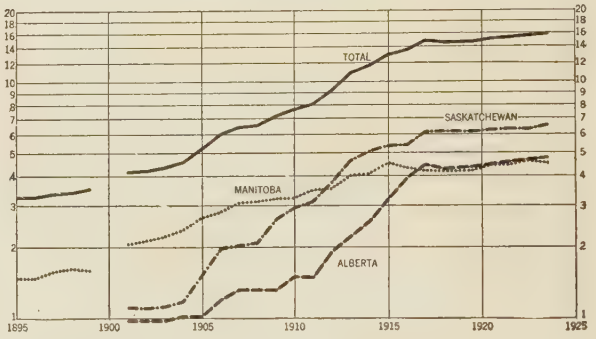
Between 1902 and 1909 the Canadian Pacific slowly built a long tributary line through Saskatoon to Wetaskiwin, a town near the northern end of the Calgary-Edmonton line. The work was carried through quietly without governmental assistance. It was most probably constructed to main-line standards, and there can be but little doubt that it was intended to secure a competitive hold on the territory of the Grand Trunk Pacific project.

The most ambitious venture was that of the Grand Trunk Railway, which had operated hitherto in Eastern Canada alone. In 1902 and 1903, in close conjunction with the Dominion government, plans were made to construct a new transcontinental all-Canadian line of first-class standards. Construction of the line west of Winnipeg, known as the Grand Trunk Pacific, began in 1905, and the line was completed to Edmonton by 1910. To the east of Winnipeg, another part of the project, a third line to Fort William and Port Arthur, was completed and opened in the same year. The eastern half of the transcontinental line was constructed by the Dominion government at its own expense, and the western half by the company with the aid of liberal Dominion loans and guarantees. Apparently little thought was given to the fact that the Dominion government was guaranteeing the securities of two competitive lines, running near one another through all their traffic-producing territory.

The construction of these main lines was naturally accompanied by the building of branches. Hence railway mileage in the prairie provinces rose by leaps and bounds, from 4,200 miles in 1902 to 11,700 in 1914. (See Chart 3.) Vast areas of vacant land were thus opened up for settlement and agriculture. The new lines not only gave the western producer access to distant markets, but also, during their construction, provided a strong and profitable local demand for his produce and for the labor of himself and his teams.

CHART 3.—RAILWAY MILEAGE IN PRAIRIE PROVINCES, 1895–1923*

(Thousand miles. Logarithmic vertical scale)



* Sources: See Appendix Table XIX.

NOTE.—Vertical lines are drawn at June 30. For years after 1918, data refer to December 31, and are so plotted.

The growing volume of wheat for export compelled improvements in the rail and water connections between the upper lakes and the port of Montreal. Accordingly, between 1908 and 1912, the Canadian Pacific and the Grand Trunk constructed new and improved ports and elevators on the Georgian Bay, and the Dominion government constructed an elevator at Port Colborne at the upper end of the Welland Canal.[1] Tolls on the Welland and St. Lawrence Canals, which included a through rate of 10 cents a ton on grain, were abolished, in 1903.

CONTROL OF RAILWAY RATES

Before 1902 control over Canadian railway rates was slight and ineffectual. The Railways Committee of the Privy Council in theory possessed complete authority, but seldom or never exercised it. Rates oscil-

[1] See below, p. 256.

lated at times in accordance with the competitive zeal of the various companies, and important reductions were secured by political bargains such as the Crow's Nest Pass agreement. A special commissioner carefully examined the whole question of regulation and reported in 1902 in favor of the creation of a Board of Railway Commissioners. Such a Board was accordingly established and appointed in 1904, and has continued in authority ever since.

The Board of Railway Commissioners was given great powers of investigation and of regulating railway rates and traffic conditions. On several occasions it has conducted far-reaching examinations into the general character of Canadian rate structures. Its findings of fact are accepted as final in Canadian courts of law, but in matters of regulation its decisions may be reviewed by the Governor-General in Council (the Cabinet of the day) and by courts of law, and it is not allowed to modify rates established by special statutory authority.

The Board has decided many points of great importance to Western Canada. Nevertheless, in cases involving the transportation of grain or some other basic commodity, an appeal has often been made to the Cabinet or to Parliament, with the consequence that political rather than economic interests have influenced the final decision. The decisions of the Board, therefore, have not yet resulted in a unified, impartial rate structure for the whole of Canada.

The Railways of Western Canada After 1914

The expansion of railway mileage in the prairie provinces, which continued till 1917, considerably exceeded the needs of the time. The newer lines fell into difficulties because they could not secure sufficient traffic to earn a revenue on their long stretches of main line through uninhabited regions supplying little or no traffic. These lines found themselves compelled to operate on a scale of low freight rates and, especially after 1914, at steadily increasing costs of operation. The fact that the Canadian Pacific was able to continue profitable operation, even under these conditions, was used as an argument to prevent until 1917 any general increase of freight rates. Though sustained for a time by further governmental advances, in the end the newer lines all fell into the hands of the Dominion itself.

Thus between 1917 and 1922, a new railway system, the Canadian National, owned by the Dominion government, was built up in Canada out of the Canadian Northern, the Grand Trunk, the Grand Trunk Pacific, and existing government lines. Since many parts of the system had been designed as competitive lines, the task of coördinating their operation was one of great difficulty, and the process of unification is still incomplete. Earnings have been small, and the Dominion government has been compelled to contribute from 50 to 70 million dollars a year for operation and for the payment of interest on the securities it had guaranteed.

The problem of railway rates is therefore one of great difficulty at the present time, because the Canadian Pacific, which is a well coördinated system, has managed to thrive on rates which cause heavy loss to the Canadian National and a heavy burden on Dominion finances. The general principle apparently followed of late is that of maintaining rates which will allow the C. P. R. to operate at a profit, even though on certain competitive routes advantages of location and construction would permit the C. N. R. to concede a lower rate. Recent judicial decisions have seriously disorganized this rate structure, however, and it has now (June 1925) been placed in the hands of the Board of Railway Commissioners for a thorough revision.

The rates on grain and its products have a recent history of their own. Strongly against the will of the West, they were raised several times between 1918 and 1921 till they stood nearly 50 per cent above the levels fixed by the Crow's Nest Pass agreement. In 1922, however, the West was strong enough to secure from Parliament their reduction once more to that level. The West is so strongly attached to these low rates, fixed by statute, that the recent instructions given to the Board include a special restriction that they shall not consider any alteration in the Crow's Nest Pass grain rates. There the matter rests.

V. THE DEVELOPMENT OF MARKETING ORGANIZATION

The practice of grading and bulk-handling wheat shipments, long before established in the United States, was brought into Western Canada after the building of the Canadian Pacific Railway, in the early days of commercial wheat-growing.[1] This method of handling requires small elevators at numerous country points, big elevators at lake and ocean ports, and, in consequence, heavy investments in fixed capital. The movement of wheat, also, has encouraged the growth of a large grain market at Winnipeg, the point through which the bulk of the commercial crop must pass.

As in the United States, elevators were erected in Western Canada in sufficient number to bring them into competition with one another, so that elevator operation usually proved profitable only when the management undertook not only the handling but also the merchandising of grain. The most efficient commercial organization for such a business had already been discovered in the United States to be the "line elevator company," operating a number of track elevators, at country points, through salaried employees, who purchased farmers' grain for the company, and a selling organization on the central market to dispose of all its purchases. Companies of this kind soon established themselves in Western Canada.

Although the local elevator operators and their companies were competing with one another, they developed trade practices which kept the farmers very much at a disadvantage. The railway service gave its support to the elevator men, because of the greater efficiency of their elevators in grain loading, and in general refused to accept grain for shipment which had not been loaded through an elevator. In the face of such a combination the farmers were at first entirely helpless, and the history of subsequent marketing organization is largely a record of their endeavors to gain commercial equality by legal guarantees and to control the grain trade to their advantage, partly by governmental regulation and partly by coöperative organization and action.

Commercial Regulation Before 1900

Grading of wheat from Western Canada, a prerequisite of bulk-handling, was instituted in Canada some time between 1874 and 1886, and was performed by qualified inspectors, appointed by commercial bodies under legal restrictions intended to secure impartiality. The standards of inspection were broadly defined by statute, and more precisely by public boards. In 1889 a Western Standards Board was established, to authorize statutory grades for western wheat; and in 1891 it was given the further right to establish commercial grades from year to year for grain which failed to comply with the standards specified by statute. At this time, wheat from the West was inspected only when it reached Fort William or Port Arthur.[2]

The first large crop of Western Canada was the crop of 1887, about 14 million bushels. This big crop encouraged the founding of the Winnipeg Grain and Produce Exchange in that year, a second and successful attempt at the creation of a grain market in Winnipeg. (An earlier attempt in the "boom" year, 1883, had failed.) The large amounts of grain to be shipped caused the farmers great difficulties in loading, so that they held up grain cars at country points and checked the movement of the crop. Probably as a consequence of this delay, the Canadian Pacific Railway gave a general undertaking in that year that wherever elevators of an approved standard were available, it would receive grain for shipment only from such elevators, provided they gave proper service in storing and shipping. In consequence of this offer, the number of country elevators considerably increased, and continued to increase during the following years. The elevators were usually owned and operated by small companies, which built short chains through

[1] For general references on this section, see Bibliographical Notes, pp. 273, 274.

[2] The account given in the earlier parts of this section on Commercial Regulation is admittedly tentative and incomplete.

neighboring country points. Other elevators were owned and operated singly by millers, farmers, and grain dealers. In the course of the 'nineties, small-scale operation declined and the control of the elevator system was largely concentrated in the hands of a few large companies.

There can be little doubt that the majority of the farmers suffered from this concentration, because the elevator companies, at least until 1898, enjoyed the wholehearted support of the railway. Thus the elevator companies were able to hold down the purchase price of wheat and to defeat the farmer on questions of grade, weight, and dockage. Complaints against the elevator system constituted one of the western grievances which aroused the attention of politicians after the new expansion of wheat-growing had begun. In 1899, as one step to reform, the point of inspection was transferred to Winnipeg and the inspectors of grain were made public officials. The same year further protests led the Dominion government to appoint a Royal Commission to investigate the alleged abuses. Many particular charges were substantiated, and the recommendations of the Commission resulted in the Manitoba Grain Act of 1900, a Dominion statute. In general the act established the system of regulation employed in Minnesota and North Dakota, which in turn was based upon the procedures of other states. It established the office of Warehouse Commissioner, with wide powers of regulation over the grain trade in the West, and gave many safeguards to the farmers upon weights, grades, dockage, and loading. Thus the act itself and its amendments in later years greatly weakened the purchasing and loading "monopoly" of the elevator system.

Government Regulation and Farmers' Coöperation, 1900–17

The summer of 1901 produced another record crop of more than 60 million bushels, heralding the appearance of Western Canada as an important contributor to the world's supplies. The conditions of 1887 were paralleled. The Winnipeg Grain and Produce Exchange established a futures trading market, which has been maintained without great interruption since that time. The size of the crop caused another grain blockade, due principally in this case to shortage of rolling stock on the railways. Increase of elevators and railway equipment followed during the next few years. Seeking a remedy of their own, the farmers themselves established the first successful farmers' coöperative associations in Western Canada. Of all consequences of the big crop of 1901, this was probably much the most important, because from that year onward the steady pressure of the farmers' movement enforced the development of the present system of public regulation of the grain trade, more highly organized in Canada than in any other country.

Prior to 1902 all the terminal elevators at Fort William and Port Arthur had been owned and operated by the Canadian Pacific Railway. In that year the Canadian Northern Railway built a terminal elevator and leased it to a commercial company. A further change took place in 1904, when the first terminal elevators were erected by elevator companies to be operated in conjunction with their own line elevators established at country points. Later the Canadian Pacific Railway gradually withdrew from the elevator business and leased its properties to commercial companies.

For the first few years of their existence, the farmers' associations undertook only the enforcement of their statutory rights at shipping points, but in course of time dissatisfaction with the prices offered for the lower grades led them to consider also the marketing of their members' grain. Accordingly in 1906 they formed the "Grain Growers' Grain Company," with a seat on the Winnipeg Grain Exchange, for dealings in that year's crop. There followed two years of offensive and defensive conflict with the Winnipeg Grain Exchange and its members, nearly fatal to all the antagonists engaged, until the questions at issue were settled by the authoritative intervention of the Manitoba government. Further hostilities broke out in 1909 and 1910, but were more easily concluded.

The farmers' movement then turned its attention to the elevator business, and in 1907 gave its support to proposals that the

provincial governments should take over the operation of all elevators at country points in their own territory and that the Dominion government should take over the operation of the terminal elevators. The Manitoba government yielded to political pressure, and in 1910 set up a line of government-owned elevators, as a competitor of the commercial lines in the province. Saskatchewan, more cautiously, made investigation and decided instead to establish a coöperative elevator company generously supported by loans from the provincial government. The Manitoba system proved a failure and was leased in 1912 to the Grain Growers' Grain Company. On the other hand, the Saskatchewan Coöperative Elevator Company, Ltd., proved highly successful and was reproduced in 1913 in the Alberta Farmers' Coöperative Elevator Company, Ltd. Later, in 1917, the Manitoba and Alberta coöperatives united to form the United Grain Growers, Ltd.

The characteristic policy of these coöperatives has always been to secure for the individual farmer the best price for his grain under the prevailing market conditions, leaving him to decide for himself the time and the manner of disposal. Under the resulting system, if he wishes to sell his grain on delivery at the country elevator, the company will pay the best price it can; if, on the other hand, he prefers to send it to Winnipeg for sale on commission, the company will make special efforts to secure the delivery of his grain in that market, and will act as his shipping and selling agent. As purchasers of grain in large quantities, these companies are also large sellers, in both the domestic and the export market.

The project for Dominion ownership and operation of terminal elevators encountered more serious opposition. In the end a partial satisfaction of the farmers' desires was obtained in 1912 by the passage of the Canada Grain Act, which replaced the old Manitoba Grain Act of 1900 and all its amendments. The central feature of the new act was the creation of a Board of Grain Commissioners, with three members, who replaced the Warehouse Commissioner and were given larger powers of control over the weighing and inspection of grain and over the whole of the grain trade in eastern and western Canada. They were also empowered to erect and operate terminal elevators at ports and elsewhere.

Acting under these powers, the Board at once proceeded to erect an elevator at Port Arthur in order to give a trial to the principle of government ownership. Soon after, it also undertook the construction of interior terminal elevators for grain storage at Saskatoon, Moose Jaw, and Calgary, and a port elevator at Vancouver. By the end of 1915 this chain of elevators was completed. It has given good service in years when low-grade crops required conditioning before shipment and at times when the movement of the crop is obstructed; but it has not proved sufficiently important to justify by itself the existence of the Board of Grain Commissioners.

The principal and most valuable service that the Board has rendered to Canada is the continual exercise of its great powers of supervision and control, which it has consistently employed to facilitate trade and transport as much as possible to the benefit of all concerned. An important instance of a change sanctioned by its experience is the gradual development of *private* terminal elevators at the head of the Lakes.[1] In these and similar developments, the regulations established from time to time by the Council of the Winnipeg Grain Exchange have also played an important part.

Wartime Control, 1917–20

The crops of 1917 and 1918 were marketed under government control. A Board of Grain Supervisors, composed of leading grain traders and representatives of the farmers and the Dominion government, fixed purchase prices and organized the collection and movement of the crop in Canada, while the disposal of the exportable surplus was performed by the Wheat Export Company, the Canadian representative of the British Royal Commission on Wheat Supplies, which directed supplies of wheat to all the European allies. This well-knit machinery operated effectively during

[1] See below, p. 254.

the war but loosened after the close of hostilities in 1918.

In the spring of 1919 the problem of marketing the coming Canadian crop became a matter of serious concern, because all the European importing countries were purchasing through national organizations and the United States was selling its wheat through the United States Grain Corporation. As a solution, the Canadian Wheat Board was established by the Dominion government and given extensive powers. In particular it could take delivery of wheat in Canada at any point, paying on delivery a price fixed by itself and issuing participation certificates for a share in future profits from the marketing of the whole crop; and it was authorized to control the trade in wheat in the home market and for export, as well as the export trade in flour. Largely on account of the efforts of the chairman, Mr. James Stewart of Winnipeg, the enterprise was a great success. The wheat was purchased at a "spot" price[1] of $2.15 a bushel, and a profit of 48 cents a bushel was subsequently distributed on the participation certificates. It was calculated that the Canadian farmer realized, on an average, 25 cents a bushel more than the United States farmer, and that the Canadian consumer paid 1½ cents less a pound for his bread.[2]

The Movement Toward Wheat Pools

The success of this compulsory "pool" of wheat evoked from the farmers' movement a strong demand for its continuance. Three alternatives were proposed—a compulsory pool, a voluntary pool without contracts, and a voluntary pool with five-year contracts. The Dominion government refused to legislate for a compulsory nation-wide pool, but passed an act through Parliament in 1922, to permit the reëstablishment of the Canadian Wheat Board for one year as a trading corporation only, without compulsory powers, as soon as any two or more provinces should have passed concurrent legislation. Both Alberta and Saskatchewan promptly passed such acts, which gave compulsory powers to the Board for its operations in those two provinces. Manitoba, however, rejected a similar measure, and thus defeated the whole project, because no leading member of the grain trade would undertake to market the crops of Saskatchewan and Alberta under prevailing conditions without possessing similar control over the Manitoba crop.

In the end the advocates of pooling accepted the situation for what it was worth and proceeded to organize voluntary pools instead, by which the producers contracted to deliver all their wheat (except that reserved for seed and for feed[3]) to the provincial pool, for a period of five years. The project made headway in the summer of 1923, but only in Alberta was a pool organized in time to gain control of any part of the crop. This Alberta pool disposed of 35 million bushels of wheat for its members, apparently much to their satisfaction. In 1924 similar pools were organized in Saskatchewan and Manitoba, and the three provincial pools have at their disposal the crop from 11 million acres—about 7½ million acres in Saskatchewan, and probably about 3 million acres in Alberta.[4] The three pools have combined to market their wheat through a single agency, the Canadian Cooperative Wheat Producers, Ltd. This latter organization has so far conducted its operations very quietly and little information has been made public concerning its marketing position, policies, and practice. It has disposed of some of its wheat through well-established commercial channels, but has also initiated the policy of direct sales to large purchasers abroad. The very existence of the pools has aroused the strong dislike of the grain trade, and their practice of paying better prices for large deliveries than for small has partially alienated the established farmers' coöperatives, which seek to secure the best possible current price for all producers, large or small. For these and other reasons a final verdict as to the success of the new venture cannot yet be given.

[1] See below, p. 253.

[2] *Chairman's Report,* Canadian Wheat Board, Winnipeg, Manitoba.

[3] In addition to seed and feed reserved for use on the farm, pool members are entitled to obtain permits for the sale of wheat for seed or feed.

[4] In January 1925 a membership of 91,291 was reported for the three pools.

VI. PROGRESS OF SETTLEMENT AND WHEAT PRODUCTION

The progress of Western Canada as a wheat producer has been made possible by the physical advantages of the country, important applications of agricultural research, a generous land policy, and an enormous development of transportation and marketing facilities. It has been alternately favored and discouraged by economic influences, affecting prices of agricultural products, the coming of immigrants, and the availability of new capital. It is now possible to sketch the growth of settlement and wheat production, under the combined influence of these factors, from their early stages to the present time.[1]

Historical Periods

Three broad periods can be distinguished. The foundations of future expansion were laid in the pioneering period, from 1870 to 1896, which opened with the purchase of Western Canada in 1869–70 by the newly-established Dominion from its earlier owners, the Hudson's Bay Company.[2] As in the United States at the same time, a closer political consolidation during the 'sixties was promptly followed by a westward expansion over the arable grasslands beyond the Mississippi and the Great Lakes. The principal events of this period in Canada were the adoption of the free land policy in the West (1871), the building of the Canadian Pacific Railway (1879–85), the grants of government land to this company and others, and the establishment of the Dominion Experimental Farms (1886). This period ended in the middle 'nineties with several years of adverse conditions, due to world-wide depression in agriculture and industry, accompanied by low wheat prices and difficulties in obtaining capital for extension either of transportation facilities or of agriculture.

In the second period, extending from 1897 to 1914, there was vast and rapid development, terminated by the beginnings of depression. This was, on the whole, a period of rising prices, of agricultural prosperity unchecked by the trade depression of 1907–08, of fairly ready availability of capital, and of large immigration. It was initiated by two years of high wheat prices. It was marked by improvements in water transportation, by a tremendous expansion of railway mileage, and by a corresponding growth of grain elevator capacity. Expansion was carried too far, and a period of lower wheat prices, in 1911–13, brought a reaction, which might have been prolonged but for the outbreak of war in Europe.

From 1914 to 1920 expansion and prosperity were revived, owing to the tremendous demand for Canadian wheat during and immediately after the war. The development was hampered by war conditions, which led to the almost complete cessation of immigration from Europe, the drain of men into war service or industrial activities, and the difficulty of obtaining new capital for agriculture and transportation. Yields per acre declined notably after 1915. Finally, with the post-war deflation of prices and with relative overproduction of wheat, this period closed in severe agricultural depression, which continued from 1921 to 1924.

Statistical Evidence

The progress of Western Canada is indicated by the curves on Chart 4, which show, so far as statistical evidence is available, the growth of population, of wheat acreage, production, and export, of immigration and land settlement, and of railway mileage and elevator facilities. The underlying data are given, in greater detail, in the Appendix. These curves are plotted on a logarithmic scale to emphasize rates of change rather than absolute magnitudes.

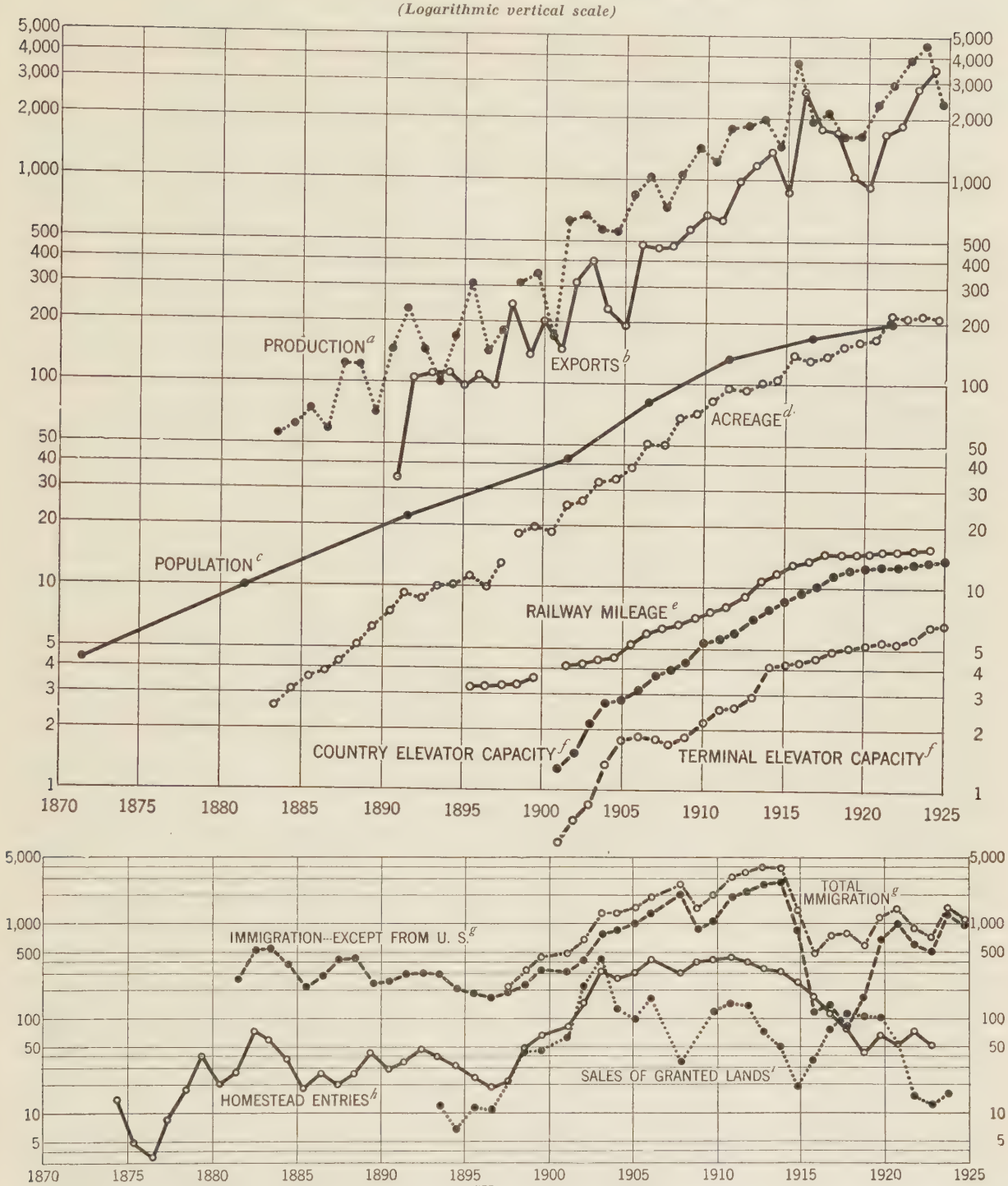
Certain facts stand out impressively. In the first place, there is the striking upward trend in population; even more in wheat acreage, production, and export; and, for the half of the period for which figures are

[1] For general references, see Bibliographical Notes, p. 274.

[2] From 1670 on, the plains of Western Canada between the Laurentian Plateau and the Rocky Mountains had been held in sovereign possession by the Hudson's Bay Company, for the benefit of its fur trade.

CHART 4.—STATISTICAL EVIDENCE OF GROWTH OF WESTERN CANADA*

(Logarithmic vertical scale)



* Sources: See Appendix Tables IV, VI, VIII, IX, XIII, XIV, XIX, XX, XXIII.

NOTE.—Vertical lines are drawn at June 30.

On the logarithmic vertical scale, equal distances upward, anywhere on the scale, indicate identical *percentage* increases; similarly equal distances downward indicate identical *percentage* decreases. Changes in absolute figures can be read roughly from the scale designations, but only relative changes are reflected graphically. This scale has peculiar virtues for such a chart as this, since it makes possible graphic comparisons of rates of increase and decrease in series which are expressed in different units and magnitudes, and between periods in which, for any one series, the magnitudes differ widely.

a Wheat: Manitoba, 1883–97; Prairie Provinces, 1898–1924. Unit: *100,000 bushels.*

b Canadian exports of wheat and flour. Unit: *100,000 bushels.*

c Prairie Provinces. Unit: *10,000.*

d Manitoba, 1883–97; Prairie Provinces, 1898–1924. Unit: *100,000 acres.*

e Prairie Provinces. Unit: *1,000 miles.*

f Unit: *10,000,000 bushels.*

g Unit: *100.*

h Prairie Provinces. Unit: *100.*

i Prairie Provinces. Unit: *10,000 acres.*

available, in railway mileage and elevator capacity. The advance from 1897 to 1914 is especially marked in every line.

In the second place, there is the pronounced influence of the agricultural depressions of the 1890's and 1920's, and of the recent war. This influence is most obvious in the curves of immigration, homestead entries, and land sales; but close observation shows the slackened rate of population growth in the 'nineties and during and since the war, the reduced rate of increase of wheat acreage in the 'nineties and since 1921, the poor wheat crops from 1916 to 1919, and the check to expansion of railway mileage after 1917, in terminal elevators after 1914, and in country elevators after 1919.

The effect of lesser economic movements is also discernible, in the advance in the late 'seventies and early 'eighties, checked in 1883–84; the moderate recovery of the later 'eighties; the check in 1903–04; and the reactions of 1907–08 and 1912–14. These influences are seen most clearly in land sales, homestead entries, and immigration, where the cumulative element is absent, but in part also in the railway mileage curve.[1]

Public Land Policies

The settlement of Western Canada has been immensely facilitated by the adoption of a generous land policy. When, in 1870, the newly-created Dominion of Canada acquired title to the lands of the Hudson's Bay Company, it sought to encourage a rapid and extensive settlement, in step with that which was then being organized in the states of the western Mississippi Valley. The Dominion government undertook a settlement survey, adopting in 1871 the rectangular system of land division in vogue in the United States,[2] and the same practice of granting land practically without charge in return for occupation and cultivation.[3] Despite numerous changes in regulations, especially during the first twenty years, these two cardinal points of the homestead policy have remained unchanged.

The duties required of homestead entrants have varied only within narrow limits. At the present time they run thus for agricultural homesteading: Any person who is the sole head of a family, or any male who has attained the age of 18 years and is a British subject, is entitled to obtain entry for a homestead of 160 acres on payment of a fee of ten dollars. The entrant must reside in a habitable house on his homestead for at least six months in each year during a term of three years. If, however, he already owns a farm in the vicinity, he may reside there instead. He must work the land each year and must seed a reasonable proportion of it in two of these years. Before he can obtain title to the homestead, he must have broken at least thirty acres of land, of which twenty must be cropped. Where the land is not suited to cultivation, the keeping of livestock may be substituted for the cropping of the land.

New settlers were not confined to crown lands. On yielding its sovereignty in the West, the Hudson's Bay Company received a grant of one-twentieth of the lands it had surrendered — altogether about 7 million acres. In compliance with this condition, section 8 and three-fourths of section 26 (in every fifth township the whole section) were set aside as Hudson's Bay Company lands. Similarly sections 11 and 29 in each township were reserved by the Dominion as endowments for education, and are known as "school lands." In 1879 the remaining sections of odd numbers were reserved for grants to railways to be constructed in the West. This policy was discontinued in 1894, when practically all such

[1] See also Chart 3, p. 232, for railway mileage plotted on a more open scale.

[2] The whole area to be settled was divided up, as nearly as possible, into a large number of 6-mile squares, called "townships," with sides running east and west, north and south. Each township was divided into thirty-six smaller squares one mile each way, called "sections." Each section was further divided into four equal squares half a mile on each side, termed "quarter-sections." The areas of "township," "section," and "quarter-section" are thus 23,040 acres, 640 acres, and 160 acres, respectively. The quarter-section has become the standard unit of farm area.

[3] Large areas of crown land have been disposed of by preëmption and sale. Whenever and wherever preemption has been allowed, the entrant for a homestead has enjoyed the right to reserve an adjacent quarter-section for subsequent purchase. Crown lands have also been regularly sold, sometimes as homesteads to those who preferred not to earn their title by occupation and cultivation.

land in the areas then surveyed had been allotted to one company or another. These granted lands could be purchased by settlers at low prices and on easy terms.

The Pioneer Period, 1870–96

The first homestead entries were made in 1872. The first new settlers came principally from Eastern Canada, bringing livestock, and settled in the grove belt of Manitoba, where they found streams and shelter for their cattle, and wood for buildings and fuel. The first settlers in the open prairie were Mennonites of German descent, who came first in 1873–74 from their earlier colonies in Southern Russia. Accustomed to life in a treeless land, they dug wells, built houses of turf, burned straw for fuel, and thus proved that the prairies were habitable.[1]

Chiefly because of transportation difficulties, however, comparatively few settlers moved into Western Canada before the construction of the Canadian Pacific in the early 'eighties. Homestead entries indeed increased, after the depression of the 'seventies, from less than 400 in 1875–76 to over 4,000 in 1878–79. But the census of 1881 showed a total population of only about 100,000 in the whole of Manitoba and the Northwest Territories, and a considerable proportion of these were Indians and half-breeds.

In the early 'eighties, however, a land boom developed as the railway connection with the Lakes was being completed. No inducement was needed to attract farmers from Eastern Canada, and settlers from many other lands were attracted by organized propaganda and immigration agencies. In the two years ending October 31, 1883, there were 13,546 homestead entries—nearly as many as in the eight preceding years; and in the three years 1882–84, some 350,000 immigrants entered Canada and 125,000 people moved into Western Canada for temporary work or permanent settlement.[2]

The expansion proved prematurely rapid. World wheat prices declined radically in 1883–84, and remained fairly steadily on this lower level until a further pronounced decline in 1891–94. The business depression that followed the crisis of 1883 doubtless exerted some unfavorable influence. A half-breed rebellion on the North Saskatchewan River in 1885 and apprehensions of danger from Indians probably deterred some intending settlers from penetrating the Northwest Territories. Much more influential was the fact that wheat varieties and agricultural methods suited to Western Canada had not been developed, so that the settlers lost their crops by droughts, early frosts, prairie fires, and plagues of grasshoppers and gophers. Red Fife wheat was not widely distributed until 1882 and 1883, when the C. P. R. brought in several carloads of seed from Minnesota. Largely as a result of the agricultural difficulties, the Dominion Experimental Farms were established in 1886, with promptly beneficial results; but the results of their experiments in farm practice, in particular the technique of the summer-fallow,[3] only gradually secured general application. For such reasons, hopes of rapid settlement were disappointed, the land boom collapsed, many settlers abandoned their claims, immigration to Canada declined, and the homestead entries ran on a lower level until 1889.

There are numerous indications that the depression of the middle 'eighties was severe. The growth of population, in Manitoba at least, was relatively slower between 1886 and 1896 than before or after.[4] Nevertheless, settlement proceeded to such an extent that by 1891 the population of Western Canada was more than double that of 1881, and the increase was largely in the white, as distinct from the Indian and half-breed, population. The number of farmers trebled, rising from 10,000 to over 30,000. The Manitoba wheat area rose from 261,000 acres in 1883 to 917,000 in 1891; and high yields in 1887 and 1891 brought crops of 12 and 23 million bushels, respectively, each of them a handsome record in its turn.

[1] At the same time, another band of Mennonites introduced into Kansas, from their former fields in the Crimea, the famous "Turkey Red" wheat, the first winter wheat to be grown with notable success in Kansas.

[2] See Appendix Tables V, VI; and Appendix 4, *House of Commons Journal*, 1887.

[3] Worked out at the station at Indian Head, by its superintendent, Angus McKay.

[4] See Appendix Table IV.

Along the line of the C. P. R. and its branches, principally in Manitoba, grain-growing was the common type of farming. Settlers on the treeless prairie largely depended on the railway for supplies of coal and lumber. They also frequently encountered difficulties of water supply. Mixed farming developed in the remoter grove belt along the North Saskatchewan River. Cattle ranches flourished in the drier grasslands of southern Alberta.

The severe decline in world wheat prices of 1891–94 (not in any way attributable to production in Western Canada), and the world-wide depression of industry, trade, and agriculture which characterized the middle 'nineties, held back development for some years. Immigration fell to small proportions. Many settlers abandoned their farms. New entrants were few, land purchases were but small, capital was difficult to procure, and little progress was made in railway construction. Those who had made some progress toward mixed farming and derived part of their income from livestock passed through these trying times much more easily than those who depended on grain-growing alone. Manitoba's wheat acreage increased but little from 1891 to 1896, and the acreage farther west was still very small. Favorable weather conditions were responsible for a record crop of 32 million bushels in Manitoba in 1895; but in spite of improved world prices, it sold on about as low a level as that of 1893.

Despite the gloom in which this early period closed, foundations for future expansion had been soundly laid. A transportation and marketing system was developed, though by no means fully extended. Basic agricultural practices had been established. A wheat of high quality, fairly well adapted to conditions in Western Canada, was widely cultivated, and had gained securely the esteem of the English market.

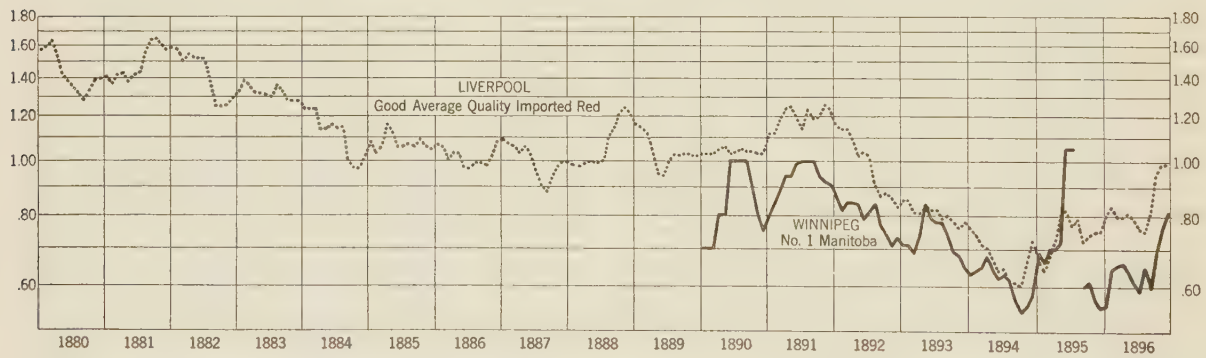
Rapid Advance, 1897–1914

With the passing of the agricultural and business depression, the situation radically changed. Two short world crops of wheat, in 1896 and 1897, caused a notable recovery of wheat prices. Lower freight rates were secured by the Crow's Nest Pass agreement of 1897, and improvements in waterways reduced export costs. Hence the farmers gained even more than is suggested by the recovery in world wheat prices. With the revival of confidence, capital for investment became more freely available. The trend of commodity prices, which had been downward since the 'seventies, turned upward about 1896, thus favoring capital borrowers as the previous decline in prices had injured them.

The years 1897–1903 witnessed a most striking advance. Homestead entries rose from 1,857 in 1896 to 31,383 in 1902–03. Land sales by grantee companies rose from 108,000 acres in 1896 to 4,229,000 in 1902–03.

Chart 5.—Wheat Prices at Liverpool and Winnipeg, Monthly, 1880–96*

(Cents per bushel. Logarithmic vertical scale)



* Sources: Canadian Department of Labour, *Wholesale Prices*, 1890–1910, p. 65; U. S. Department of Agriculture, *Yearbook, 1923*, p. 630.

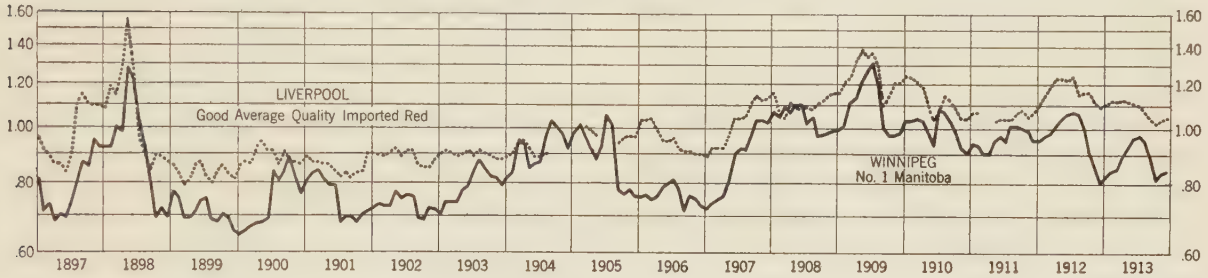
Immigrants increased from about 17,000 in 1896 to 128,400 in 1902–03. Wheat acreage rose from little more than a million acres in 1896 to more than three million in 1903. A splendid yield in 1901 brought a crop of 63 million bushels, which caused serious congestion in the transportation system, and presented Canada to the world as an important factor in the international wheat market. The large crop of 1901 and the increasing acreage of subsequent years were followed by a notable increase in elevator capacity, both at country points and at the head of the Lakes.[1]

possible the extension of wheat cultivation into areas where Red Fife could not be grown with profit. Its excellent yields and high milling quality commended it to growers and millers alike.

Owing chiefly to the recovery of the late 'nineties, the population of Western Canada increased by 200,000 in the decade 1891–1901; but because of the long depression, the increase was at a lower rate than in the preceding or the following decade. Between 1901 and 1906 the population nearly doubled, increasing by about 400,000. In the decade 1901–11 it more than trebled,

CHART 6.—WHEAT PRICES AT LIVERPOOL AND WINNIPEG, MONTHLY, 1897–1913*

(Cents per bushel. Logarithmic vertical scale)



* Sources: See Chart 5, p. 242.

This first rapid advance was followed by a longer period of persistent expansion, despite the fact that wheat prices ruled on a lower level than that of 1897–98. Railway construction, already under way, led to a rapid increase in railway mileage from 1904 to 1913.[2] Homestead entries remained above 30,000 a year. Immigration continued to increase. Wheat acreage, production, and export rose by leaps and bounds. In 1906 a record crop of over 100 million bushels was harvested from about 5 million acres. In 1911 to 1913 three excellent crops of 180 to 200 million bushels were harvested from an area of about 10 million acres. Exports rose accordingly and averaged 116 million bushels a year from these three crops.

In the latter part of this period, Marquis wheat, first commercially grown in 1906, began largely to supersede Red Fife. Because of its shorter growing season, it made

increasing by 900,000. The occupied farm area rose from 15,412,000 acres in 1901 to 57,642,000 in 1911, and the improved area from 5,593,000 acres to 22,970,000.[3]

This tremendous growth, while due in part to natural increase of population and in part to migration from Eastern Canada, was greatly influenced by the huge tide of immigration. The Liberal Party, after its accession to power in 1896, enlarged and improved the old immigration service, sent agents abroad, and began the practice of advertising the free lands of Canada in the newspapers of the United States and, later, of Great Britain. The exhaustion of the free lands in the United States turned to Canada a stream of experienced farmers of the pioneer type. A movement from Central and Eastern Europe began in 1896 with the entry of Galician peasants. An important British movement began after the end of the South African war. These movements from overseas were due not merely to the wide publicity given to the attractions of

1 See Chart 4, p. 239, and Appendix Tables XIV, XX.
2 See Chart 3, p. 232.
3 See Appendix Tables IV, XII.

Canada by government and railway immigration service, but also, like the movement to the United States in the same period, to the strenuous competition of ocean shipping companies for the immigrant traffic.

From less than 22,000 in 1897, the annual inflow rose, with only a brief check in 1903–04 and a temporary recession during the depression of 1908–09, to a peak of over 400,000 in 1912–13. Despite emigration to the United States and return of immigrants to Europe, the net inflow contributed heavily to the increase in Canada's population from 5,371,000 in 1901 to 7,207,000 in 1911. While by no means all of the newcomers proceeded to Western Canada, a large proportion entered with this avowed intention.[1] Others, who had declared an intention of proceeding to Eastern Canada, went later on to the West. It is significant that whereas in 1901, as shown by Appendix Table V, two-thirds of the population of Western Canada was of Canadian birth, in 1911 nearly half of the larger population, in all some 647,000 people, were reported born abroad.

The general success of the wheat growers, even including some who were ignorant or careless of sound farming practice, unfortunately brought mixed farming into disrepute. The reduction of freight rates on grain, together with inadequate local markets for livestock and dairy products, encouraged wheat-growing and discouraged the breeding and feeding of cattle. This proved especially unfortunate when wheat prices declined.

The years 1904–09 were noteworthy for increases in land values, in consequence of the extension of the railway net and the rush of settlers into the West. This is clearly indicated by the price of land sold by railway companies and other grantees (Appendix Table IX). For several years prior to 1904 the average price of such lands had ranged from $3.00 to $3.50 an acre. In the next few years it rose rapidly until in 1909–13 it ranged from $13.00 to $14.00 an acre. These of course were prices of unimproved lands. Land in farms rose in price also, though in lesser degree. There was considerable speculation in lands, often with borrowed money, which intensified the natural tendency to increasing land values.

The development of towns and cities in the West accompanied the agricultural expansion, as railway centers developed and as mercantile and other business developed to serve the agricultural population. Railway construction and operation required large forces, and created a demand for local produce. The construction of public works of all kinds by provincial and local governments, often in grandiose style, the erection of private buildings in cities and towns, and the expenditures of later settlers in developing their holdings, all helped to maintain strong local markets for the produce of the established farmers. The air of prosperity attracted still more newcomers. Provinces and municipalities ran heavily into debt, and farmers and townsmen incurred heavy obligations, to which they were encouraged by the eagerness of those who had land or goods to sell or money to lend.

The expansion was overdone, the land boom broke, and a period of moderate depression followed. Wheat prices, after rising materially from 1906 to 1909, declined sharply in 1910, and tended downward until 1914, though in 1912 they recovered temporarily. Although even the low level of 1913 was slightly higher than the average from 1899 to 1906 and excellent yields in 1911–13 partially offset the decline in price per bushel, costs had risen to such an extent that the growers' profits were seriously diminished.[2]

Moreover, by 1909 the bulk of the best agricultural land with access to railways had been taken up, high prices were asked for lands available by purchase, and later comers had to seek more remote or less favorable lands. Much of the settlement of the dry lands on the third steppe occurred after 1909. The decline in wheat prices reacted heavily upon farmers who had mortgaged their lands or had instalments of the purchase price to meet. Consequently, land sales and homestead entries declined after 1910–11. Cancellations of

[1] See tables in *Annual Reports of the Department of the Interior*, particularly that of 1915.

[2] Cf. *Report of the Grain Markets Commission of Saskatchewan*, 1914, p. 22.

entries (because of failure to perform the prescribed duties) increased out of proportion to new entries, and, in the four years ending March 31, 1914, were nearly half as numerous as new entries. This unprecedented proportion bears witness to the difficulties homesteaders were experiencing in maintaining themselves on their lands. Wheat acreage increased but little from 1911 to 1914. While immigration continued to a high point in 1913–14, a smaller proportion of the newcomers declared an intention to proceed to Western Canada.

The War and Post-War Years, 1914–24

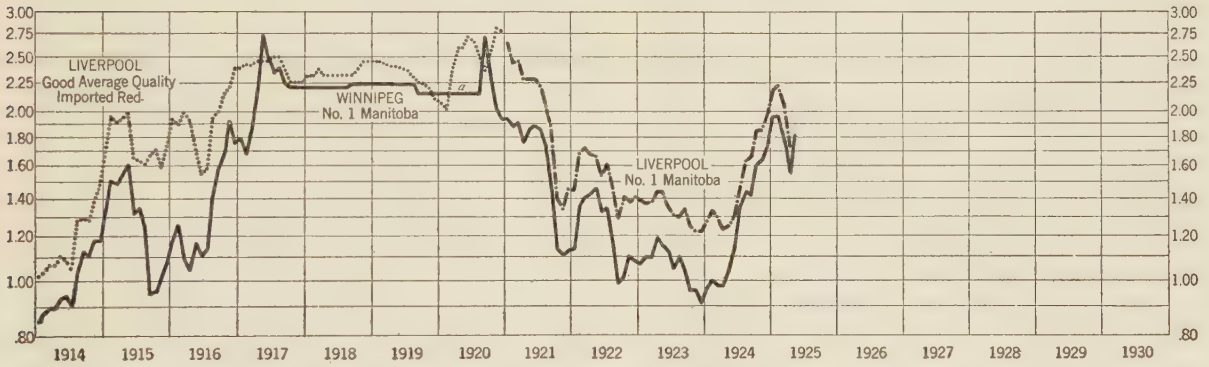
Under any ordinary circumstances, the poor yield of the 1914 wheat crop would have intensified the agricultural depression; but the outbreak of war modified all prevailing conditions and tendencies, and brought into being a host of new and conflicting influences.

In the first place, it raised wheat prices so that the poor crop of 1914 was probably more remunerative than the good crop of 1913.[1] Excellent world crops in 1915 temporarily reversed the upward movement of wheat prices, but Canadian farmers, thanks largely to exceptionally favorable weather conditions, planted a record area of over 13 million acres and harvested a record crop of 370 million bushels. The yield was nearly 27 bushels an acre, the highest ever yet attained by Western Canada. Its estimated farm value was 325 million dollars, more than double that of any previous crop; since production costs had not yet risen greatly, this meant a large net return and great prosperity for the wheat grower. During the later stages of the war, nearness to Europe gave Canada and the United States a great advantage in marketing their wheat, and wheat prices rose by strides to much higher levels, until for the crop of 1918 a price of $2.24 a bushel was guaranteed to the growers.

In the second place, the war greatly affected Canada's supply of farmers and farm labor. It abruptly checked the influx of immigrants from Europe, and recalled to military service many of those who had come over in recent years. Large numbers of Canadians enlisted, and others took up munitions work. Hence the number of established farmers was probably somewhat reduced, and the ordinary supply of farm labor, permanent and temporary, greatly declined. Pressing requirements at critical seasons were only inadequately met by organizing the labor of boys, townsmen, and new homesteaders. Homestead entries declined steadily, from a high point of 44,000 in 1910–11 to 32,000 in 1913–14 and to 4,000 in 1918–19, and cancellations reached even

Chart 7.—Wheat Prices at Liverpool and Winnipeg, Monthly, 1914–25*

(Cents per bushel. Logarithmic vertical scale)



* Sources: U. S. Department of Agriculture, *Yearbook, 1923*, p. 630; Winnipeg Grain Exchange, *Annual Report, 1924*, pp. 35–49, supplemented by *Grain Trade News;* International Institute Crop Reports.

Note.—Liverpool prices are converted to Canadian money at current exchange rates.

a As stated in the text, the guaranteed price was $2.15, but 48 cents additional was later paid to holders of participation certificates, making the actual return $2.63.

[1] See Appendix Table XVIII.

higher proportions than in 1911–14. Agricultural operations were severely hampered by the shortage of labor, and costs of cultivation and harvesting rose considerably. Despite the stimulus of high wheat prices, these conditions restricted the expansion of wheat acreage; it increased only from 13,867,000 acres in 1915 to 17,750,000 acres in 1919, principally in western Saskatchewan and Alberta,[1] the regions of most recent settlement.

Sound farming methods were frequently sacrificed in the effort to maintain wheat acreage. Summer-fallowing was reduced, and wheat was often sown in ground that had been but poorly prepared. The earlier tendencies to improvement in farming methods and the development of mixed farming were thus set back, in favor of the older inferior practices of pioneer grain-growing. For this reason, and because conditions of weather were on the whole unfavorable, the wheat crops from 1916 to 1919 were poor in yield and high in cost. The great rise in price provided ample compensation and enabled many farmers to purchase additional land,[2] even at higher prices; but the Canadian wheat farmer did not again enjoy the prosperity which followed the crop of 1915, and much of his apparent prosperity was fictitious.

In the first two years after the war the labor shortage was relieved by the return of men released from the armies and by the resumption of immigration from Europe. Sales of railway lands continued on a high level and at good prices. Homestead entries increased but little because the best homestead lands were reserved for returned soldiers. There was, however, no land boom in Western Canada, and no advance in farm land prices comparable to that which then occurred in parts of the United States, probably because of four disappointing harvests in succession and a shortage of investment capital.

[1] Dominion figures. The provincial estimate of Alberta is much lower and leads to a total of 16,315,000 acres. See Appendix Tables XVII, XIV.

[2] See Chart 4, p. 239, and Appendix Table IX, for yearly sales of granted lands.

[3] From 544 million dollars in 1914 to 3,042 million in 1920. Interest charges rose at the same time from 12.9 millions to 107.5. See *Canada Year Book*, 1921, *et seq.*

The crop of 1919 was marketed by the Canadian Wheat Board, greatly to the advantage of the growers, with a final return of $2.63 a bushel. After the operations of the Board had ceased, fortune turned against the farmer in the autumn of 1920, with a tremendous decline in the price of wheat, due primarily to world conditions which affected prices in general as well as wheat prices in particular. At first the farmers refused to believe that the decline in wheat price was anything more than temporary, and many of them held back wheat of the new crop. With abundant agricultural labor and favorable weather conditions, a campaign to "Plant More Wheat" led to a large increase in 1921, partly in the hope of better prices or of offsetting reduced price per bushel by larger crops. Thanks to increased yields, each of the four crops from 1920 to 1923 was larger than its predecessor. Partly under the influence of these large supplies, prices continued to decline, until in 1923–24 they stood but little above pre-war levels. Since costs of production, though also declining, remained much above pre-war costs, acute agricultural depression resulted; but because Canadian yields rose during these years, the depression was probably felt less keenly by farmers in Canada than by those in the United States.

The depression was intensified by the burden of public and private debt. The Dominion debt had greatly expanded during the war,[3] and provincial and municipal indebtedness had also increased. These debts involved an increase in the tax burden. The farmers themselves had only too often found in the day of prosperity fresh opportunities for entering into debt. Even if they had been free from such loads of public and private debt, the price at which they sold their grain would hardly have paid the prime costs of growing it, so that with fixed charges included they were in a bad way indeed.

Many farmers abandoned their land, particularly in the drier districts where crop failures had been most frequent, and sought industrial employment in Canada or the United States. In consequence of the depression, immigration declined after 1921,

until industrial improvement took place in 1923–24 in advance of agricultural recovery. Homestead entries remained on an exceptionally low level, and cancellations of entries exceeded new entries. Land sales fell to a very low figure, and the average price of unimproved lands declined materially. Wheat acreage not only ceased to expand, but even declined slightly from 1921 to 1924. Nevertheless, the period of depression had the good effect of encouraging sounder methods of farming and a more stable, permanent type of settlement.

The period of depression apparently ended in 1924 with a marked recovery of wheat prices, due chiefly to reduced world supplies coupled with some increase in world demand. The short Canadian crop of 1924 helped to make the world shortage, and the rise of prices was such that the 1924 crop of 262 million bushels had a slightly higher estimated farm value than the crop of 474 millions the year before. The costs of planting the 1924 crop were lower, and naturally the costs of harvesting also, so that this short crop was probably more profitable to the growers than any of its immediate predecessors. With this recent good fortune, and the prospect of a large crop and a satisfactory price in 1925, there is reason to believe that the severe agricultural depression is ended.

VII. SOME ECONOMIC ASPECTS OF FARMING

The larger part of the more accessible farm lands of Western Canada passed into settlers' hands between 1897 and 1914, much of it indeed between 1901 and 1911. Large portions of it could be obtained as homestead land at the price of labor, and much of it could be purchased at a low price from companies with land grants. Opportunity to obtain virgin farming land of high quality on such easy terms was widely advertised in order to attract settlers. Many of those who came were men of very limited means, without much knowledge of farming in general or of the particular requirements of Western Canada. They came partly with the expectation of gaining wealth in a few years from the profits on a few large crops from virgin soil, and partly in the hope that the further progress of settlement would steadily raise the value of the land on which they settled.

In order that their labor might become effective on the land they occupied, it was necessary that credit should be freely available to them from the very beginning. This was indeed most freely supplied during the years of most rapid advance, and not always to the settlers' benefit. In general, the funds supplied to the West at this time created strong local markets for produce. This increased the prosperity of the West at that time and attracted new settlers. The value of farm lands rose, and thus became a basis for the supply of further credit. So the round continued, until most of the good land within the railway belt had been occupied. This result was accompanied by a fall in the price of wheat, which brought depression upon the producers. Credit facilities greatly tightened, and foreclosures on farm mortgages became sufficiently numerous to cause alarm.

It is now pertinent to pass in review certain economic aspects of present-day farming in Western Canada, as it has developed under the historical conditions described. In particular, consideration must be given to the disposition of land, the size of farms, the credit situation, and the sources of farm income.[1]

Land Disposition to 1921

Up to 1921 some 200 million acres of land had been surveyed in the prairie provinces. The disposition of these lands, shown in greater detail in Appendix Tables VII and X, may be summarized as follows, in millions of acres:

Area surveyed		200.3
Available for entry	25.7	
Forest reserves, etc.	28.9	
Road allowances, Indian reserves, timber and grazing leases, etc.	25.9	
Total unallotted		80.5

[1] For general references, see Bibliographical Notes, pp. 274, 275.

Hudson's Bay Co. grants	6.6	
Railway grants	31.9	
School lands	9.3	
Special grants	16.8	
Under homestead	54.1	
Irrigation system sales	1.1	
Total allotted in private ownership		119.8
Improved land in farms	44.8	
Unimproved land in farms	43.1	
Total in farms		87.9
In private ownership not in farms		31.8

Thus out of a total of 88 million acres in farms, some 54 million had been acquired under homestead and 34 million by purchase from government grantees. The improved land in farms amounted to nearly 45 million acres. Of this area approximately 22 million acres were planted to wheat, and another 10 million acres were in summer-fallow,[1] in preparation for wheat. Accordingly the total area devoted to wheat culture amounted to more than two-thirds of the improved farm land. There remained available for homestead entry some 26 million acres, and in private hands not in farms some 32 million acres, a total of 58 million acres potentially available for expanding the present farm area.

Size of Farms

The subject of the size of farms and its relation to agriculture can best be studied in connection with the census reports of 1911 and 1916, particularly the latter. Table 2 indicates the distribution of farms in Western Canada in broad size-groups according to these censuses. Half the farms of Western Canada lay in the class between 101 and 200 acres, and there can be little doubt that practically all in this class were a quarter-section in size. Larger farms of many sizes from a half-section upward were to be found in the West. A rough computation gives an average area for this group of about three quarter-sections, but this figure has no special significance as a typical size for that time.

[1] See Appendix Table XV for figures of summer-fallow acreage.

The figures for 1916, shown in Table 3, supply information on many points which were not brought out in the earlier reports and concerning which no further census data are yet available.

Table 2.—Farm Holdings in Manitoba, Saskatchewan, and Alberta, 1911 and 1916*

Size-groups	Number of farms in group		Percentage of total	
	1911	1916	1911	1916
100 acres and under	12,784	8,610	6.3	3.9
101–200 acres	100,679	94,388	49.5	43.2
201 acres and over	90,011	115,565	44.2	52.9
Total	203,474	218,563	100.0	100.0

* *Fifth Census of Canada*, 1911, Vol. IV (Agriculture); *Census of the Prairie Provinces*, 1916.

When these figures are compared with those of 1911, the first point of interest to be observed is that the number of quarter-section farms—roughly the 101–200-acre group—declined from 101,000 in 1911 to 94,000 in 1916, from 49.5 per cent of the total to 43.2 per cent. During the same period, the number of larger farms increased from 90,000 to 116,000, from 44.2 per cent to 52.9 per cent.

Table 3.—Farm Holdings in Manitoba, Saskatchewan, and Alberta, 1916*

Size-group	Number of farms in group	Area of land in group (million acres)		Average size of farm (acres)	
		Total	Improved	Total	Improved
100 acres and under	8,610	0.36	0.15	42	17
101–200 acres	94,388	15.05	5.27	159	56
201–320 acres	68,908	21.65	11.27	314	164
321–480 acres	21,836	10.03	5.87	459	269
481–640 acres	13,348	8.36	4.91	627	368
641 acres and over	11,473	17.85	6.86	1,555	598
Total	218,563	73.30	34.33	335	157

* *Census of Prairie Provinces*, 1916.

There can be but little doubt that the quarter-section farm is the typical land-holding of the newly-established settlers and that the substantial decline of its numbers between 1911 and 1916 was due to the falling off in settlement after 1911, the enlistment of settlers after the outbreak of

the war, and the enlargement of existing farms. Farms of a half-section and over are the farms of men who have been in the country for a term of years and have had time and opportunity to acquire additional land. A comparison of total and improved areas helps to confirm this opinion, because the fraction of improved land is much lower in the quarter-section farms—about one-third—than in the farms of a half to a whole section, where it stands at more than a half.

This tendency to enlargement of farms was made possible by the existence of large supplies of land at low prices, which could be bought and sold light-heartedly. The seller could always count on being able to purchase other land if he wanted it, and the purchaser could easily obtain credit facilities to finance the transaction. The motives for such an enlargement of farms are variously stated. Western opinion considered that the supply of labor and capital required to work a quarter-section of land was practically sufficient for a farm two or three times as big, and that the settler was acting in his own best interests in seeking to gain a larger holding and a greater production from his capital and labor. Less favorable opinion, on the other hand, has attributed the desire for expansion to a speculative land-hunger on the part of the farmers, and considers that they have commonly acquired for themselves more land than they can profitably farm. There is room for both of these views to exist, and justice in both of them.

The figures so far published for 1921 do not allow of any exact comparisons with 1916 or any adequate statement of tendencies in recent years. The number of quarter-section farms was 95,000 in 1921, almost exactly the same as in 1916, but in 1921 only 37.2 per cent of the total number. The number of farms of larger size had risen still further to 151,000, 58.9 per cent of the total. Until further details are published, the significance of these figures cannot be properly estimated, but they suggest that the tendencies prevailing between 1911 and 1916 have continued to operate.

The statistics of 1916 stand by themselves in showing the existence of a number of large farms, a section or more in area, and an average size of nearly two-and-a-half sections. The importance of such large farms can be judged from the fact that they occupied nearly a quarter of the farmland area of the West, but beyond this little can be said with certainty. Some of the large holdings are cattle ranches, some are probably family holdings, and others large individual holdings. Others again are large grain farms owned by commercial organizations and operated by managers and hired workers. This last class of large farms is now reported to be disappearing by division into smaller farms of quarter- or half-section size for transfer to independent farmers.

Mortgages and Credits

The census returns of 1921 state that four-fifths of western farms are owned by their occupiers. This statement takes no account, however, of the extent to which the farms have been placed under mortgage by their owners, and of other kindred modifications of ownership. In many cases land has been purchased from companies with land grants or from private owners, under some scheme of amortization payments. Such terms vary at the present time from a seven-year scheme with the Hudson's Bay Company to thirty-five years with the Canadian Pacific Railway. Apart from such instalment-purchase schemes, mortgages are commonly taken by mortgage investment companies. They are drawn for a term of five years, and as a rule make no provision for gradual repayment, the farmer merely facing the alternatives of repayment or renewal at the end of the five-year term.

Since 1917, each of the provincial governments has also established a farm-mortgage system, including a thirty-years' amortization plan. The Alberta system has never been put into effect, through difficulties in borrowing money to lend to the farmers. Manitoba and Saskatchewan have each lent about eight million dollars. The total volume of farm mortgages, though not determined, is much greater than this, so that the provincial systems have not worked any important change in the situation. The question of Dominion support

to the provinces, for further extension of these long-time credit schemes, is still under consideration.

Short-time credits are of course available to farmers from banks on an ordinary commercial basis, and credits are also freely given by implement dealers, storekeepers, and other traders. Credits of this kind are usually arranged to expire a little after harvest time. Thus they put the farmer under pressure to haul his crop to a local elevator and sell it at the earliest possible moment, even though his autumn plowing may be impeded.

These forms of credit are probably adequate to finance the raising of the wheat crop year by year, though at heavy cost to the farmers. For the raising of livestock, credit is still but little available. Saskatchewan and Alberta have established systems for cattle loans. Manitoba and Alberta have also legalized the formation of coöperative credit societies to facilitate short-term borrowings for general farming purposes. The extent and the success of these schemes are matters on which opinions must be allowed to differ.

During the years of high prices from 1916 to 1920, a large number of farmers used the time of prosperity to incur fresh debts on land and property rather than to pay off their old debts, with the result that the ensuing fall of agricultural prices from 1920 to 1924 involved them in terrible difficulties. To protect them from pressing demands by their creditors, who were themselves in serious straits, the provincial governments undertook the work of debt adjustment. The mortgage companies, the principal mortgagees, also introduced the practice of crop-share-leases, making the farmer-owners into tenants for the time being. In either case the purpose was the same—that of preventing distraint upon the farmer's land for his debts and of maintaining him on his farm in the hope of better times to come. Many farmers abandoned their land during the depression, and there can be but little doubt that by these means many more who would have done so were rescued from the worst of their difficulties and carried through to the time of recovery.

Farming Income

In years of prosperity the chief hopes of the farmer have been for big profits on his grain crops and a steady rise in the value of his land. In times of depression his crops have scarcely paid their way, and he has been compelled to rely for subsistence largely on the produce of his farm and to seek cash for current expenses by means which he would at other times have neglected.

The position of the farmer during the last few years has been rendered particularly difficult by reason of his debts and the high costs of labor and commodities. The payments of labor for plowing, harvesting, and threshing, and the cost of seed, had necessarily to precede all other expenditures, and when they had been discharged, the balance that remained was entirely insufficient both to make payments on land and debts and to provide for family maintenance.

One of the consequences of the decline in the value of cash crops has been a widespread tendency to seek income from livestock. Farmers have taken beef cattle for winter-grazing, to be disposed of in the spring. Quite generally, they have given much greater attention to milk and its products. At the present time about four-fifths of the farmers own milch cows, and the average holding in this region is four or five cows to a farm.

The animals are cared for and milked by family labor. The milk is passed through a cream separator and the cream is shipped by rail, often for long distances, to some large central creamery. The skim milk is used on the farms or wasted. Great efforts have been made by the Dominion and provincial governments to obtain a supply of high-grade cream from the farms and to produce a first-class butter for the market. The results may be seen in a great increase of butter production in Western Canada.[1]

The payments for cream have been an important source of family income during

[1] Butter production of Manitoba, Saskatchewan, and Alberta has been as follows:

1910	6 million pounds	1920	26 million pounds
1915	17 million pounds	1923	39 million pounds

the depression, because of their fairly regular distribution through the year, because they are the result of family labor, and because they cannot be so easily attached by creditors. These advantages have probably given cream payments a value considerably in excess of the mere money total involved. Whether they will be sought so eagerly in the future as in the past it is not possible to say. In spite of these small holdings of cattle, which involve only a minor diversification, the western farm is still predominantly a grain-growing farm, in both organization and equipment. The development of grain-farming has already involved the producers heavily in debt, and a general development of diversified farming would make heavy additions to their load.

VIII. CANADIAN WHEAT MOVEMENT FROM FARM TO MARKET

With this background of the development to transportation, marketing, settlement, and wheat-growing in Western Canada, it is possible to trace the flow of Canadian wheat from farm to mill or to seaboard, and to describe briefly the various agencies that affect its transport and marketing at the present time.[1]

Part of the wheat is kept on the farm or in the district—high-grade wheat for seed, low-grade wheat for feed; but some of the seed wheat is bought from seed specialists, and some of the feed wheat is marketed at points distant from the farm. Seed wheat and feed wheat constitute only a modest fraction of a crop, and the great bulk of the wheat is shipped to market.

Bulk handling is characteristic of the whole process. From the threshing machine to the flour mill or to the foreign market, the grain is moved and stored in the loose, and, wherever possible, advantage is taken of the facility with which it will "load by gravity."[2] While this involves heavy investment in elaborate equipment, it makes for extreme economy in operation.

From Farm to Country Elevator

Few Canadian farmers have farm granaries sufficient to store considerable quantities of wheat. This is due to several causes. The erection of granaries requires capital, and the variation in crops is so great from year to year that storage space sufficient for the larger crops would involve burdensome capital charges. The labor supply is more abundant at harvest time than later. The condition of the roads in winter interferes with economical hauling. In the spring all efforts must be concentrated upon cultivating and seeding. Moreover, the farmer needs the cash for his crop in the fall to pay off his harvest labor and his other debts. Accordingly, the threshed grain, often full of weed seeds,[3] is commonly run direct from the thresher into farm carts or wagons, hauled at once to the nearest railway station, and delivered to a track elevator there.

At Country Elevators

Practically all country stations in the wheat areas are provided with one or more track elevators. For the year 1924–25, some 4,200 such elevators, with an aggregate capacity of 138 million bushels, were licensed for operation in the prairie provinces.[4] For the most part these elevators are owned in series by commercial elevator companies, milling companies, and farmers' coöperative companies. Each elevator contains a number of bins, nine or more, which hold in all from 20 thousand to 50 thousand bushels. Each elevator is equipped with scales for weighing the farmer's grain, with machinery for loading it into the bins, and with a spout for discharging it into freight cars on the siding. The country elevators are licensed yearly by the Board of Grain Commissioners, and each operator must

[1] For general references, see Bibliographical Notes, p. 275.

[2] The "angle of repose" of wheat is 45°. To avoid clogging in spouts through which it is run, wheat should be arranged to flow, if possible, at a much steeper angle than this.

[3] Threshing and shipment are usually so much hurried that there is no time for cleaning grain on the farm—clearly the best place. The country elevator is equally unable to undertake the task, and the mixture of grain and weed seeds must go, as a rule, to a terminal elevator before it can be cleaned.

[4] See Appendix Table XX.

give a bond to the Board, as protection to the farmers with whom he deals.

The farmers' wheat is roughly graded at the track elevator. Only the more obvious distinctions of variety, weight per bushel, color, and cleanliness are here considered, and other important commercial characteristics, such as protein content, are disregarded. An elaborate system of grades has been developed and incorporated in the Canada Grain Act (1912). For example, the highest grade, No. 1 Manitoba Northern "shall be sound and well-cleaned, weighing not less than 60 pounds to the bushel, and shall be composed of at least 60 per cent of hard Red Fife or Marquis, and must be free from amber or red durum and rye." It is so important to the farmers that these grades shall be properly respected, that they are enforced by a body of inspectors who are paid servants of the Dominion government and work under the control of the Board of Grain Commissioners alone.

The farmer who offers his grain for sale at a track elevator may endeavor to come to terms with its operator on the questions of grade, cleanliness (dockage), and price. If they agree, the farmer is paid for the weight he delivers, and the elevator man runs the grain into the bin of the grade assigned to it. Even if they do not agree, the grain may still be purchased: The elevator man runs it into a bin marked for the grade he assumes it to have. At the same time he must agree to pay the current price for the grade that may be finally given to it by an official inspector. This decision is obtained on the basis of a sample taken from the delivery and sent to the Inspection Office at Winnipeg.

The farmer who does not wish to sell his grain at once may use the local elevator for storage and shipment only, and the operator is compelled by law to supply him with storage space at established charges, so long as there is room in his bins. In this case, again, the farmer may accept the operator's grade and dockage, or he may seek instead the decision of the Grain Inspector at Winnipeg. Not all farmers or elevator operators are experts on legal grades and the regulations of the Canada Grain Act, and hence in many cases the procedures here described are only very loosely followed. It is a common complaint against the local elevator men that they grade too high, in order to please their customers, and that they make too big a deduction for dockage as an offset.

If the farmer wishes to retain ownership of his grain until it reaches the big market points, he may obtain storage for it in a special bin in a local elevator, if such a bin is available, or he may load it directly into a freight car without passing it through an elevator. To give opportunities for direct loading of this kind, the railway companies are required to provide cars and a suitable loading platform at any station where a sufficient demand is made. But not many farmers can bring in enough grain to fill a freight car, which holds 1,000 to 1,200 bushels or more.

Shipment to Market Centers

Country elevators are not used for prolonged storage of grain. Their profits on handling depend upon the amount of grain which passes through them in the season—usually two or three times their capacity. The sellers also desire to get their grain down to the head of the Lakes before December, in time to be shipped out before navigation closes. From September to December, therefore, the railways are under tremendous pressure to move as much grain as possible.[1] Even distribution of grain cars among shippers is enforced by law, to prevent unfair discrimination by the railways in favor of the elevators. In times when the supply of cars is short, each shipper, large or small, elevator man or farmer, must await his turn for a car and can receive only one car at a time. In preparation for their heavy task, the railway companies begin as early as March to get their rolling stock ready, and gradually move it into the West for distribution there. For the 1923 crop, the C. P. R. thus collected 36,000 cars which had been prepared for grain, and the C. N. R. 40,000; these cars

[1] As shown by Appendix Table XXVII, an average for the four crop years from 1920–21 to 1923–24, shows that 150,000 cars of wheat were loaded in Western Canada in the four months of September to December, 70 per cent of the loadings for the average crop year.

carried on an average three or four loads of grain each from country points to the head of the Lakes. Because of the legal pressure to provide grain transportation, the railway companies at times refuse to allow their grain cars to go outside of Canada, lest they lose control of them at critical periods.

Inspection

The stream of freight trains runs mostly to Winnipeg, thence to the twin port of Fort William and Port Arthur, on the shores of Thunder Bay at the head of Lake Superior. Winnipeg is the point of inspection for grain shipped eastward to the Lakes, either Calgary or Edmonton for grain to Vancouver. A new point of inspection is now being established at Moose Jaw, to give Saskatchewan farmers the benefit of a prompt inspection and the opportunity to direct their cars eastward or westward as they see fit. Other inspection points of this kind in central positions may also soon be established if the experiment at Moose Jaw proves a success.

At the inspection point, employees of the Inspection Service open the grain cars, take samples, and send the samples at once to the Inspection Office for official grading. Grain is bought and sold in the Winnipeg Grain Exchange on the basis of the grade assigned to it by the official inspection certificate. If an elevator company's agent has been overgrading at a purchasing point, his mistakes will be corrected by the Inspection Office, with consequent loss to his employer.

During the three busiest months of the year, September, October, and November, more than 2,000 cars a day may thus be examined at Winnipeg. The first grain to arrive comes in over the C. P. R. from the southern districts, where it has ripened earliest, and a few weeks later over the C. N. R. also, from the more northerly districts. Grain from the eastern districts naturally arrives earlier than grain from the western. When the sample has been taken, the car concerned is usually run to one of the big terminal elevators at Fort William or Port Arthur, where its cargo is unloaded, weighed under official supervision, and run into the bin for the grade assigned to it by the inspection.

At the Head of the Lakes

Winnipeg on the one hand and Fort William and Port Arthur on the other, are essentially two halves of the same grain market. Winnipeg is the assembling and inspecting point, partly for historical reasons, partly because of its nearness to the producer and the consequent ease of communication with him. It is also the center of trading activities. Fort William and Port Arthur stand some four hundred miles nearer to the ultimate destination of the wheat, at the head of five different transportation routes to eastern lake and ocean ports. They are therefore a most suitable place for grain storage on the largest scale, so that "wheat" in Winnipeg usually means wheat that has been graded at Winnipeg and weighed into store in elevators at Fort William or Port Arthur. This is termed "spot wheat" and its price the "spot price."

Storage capacity is offered at Fort William and Port Arthur by terminal elevators with an aggregate capacity now about 64 million bushels.[1] Until 1920 practically all storage and handling was performed by the public terminal elevators alone, but since that time, under practices sanctioned by the Board of Grain Commissioners in 1917,[2] a large part of the business has been performed by elevators operating under a private terminal license. Partly by new construction and partly by the conversion of public elevators, there has been of late a rapid increase of private terminals, both in number and capacity. Though still well below the public terminal elevators in capacity, in the crop year 1923–24 they took the lead for the first time over the public terminals and handled more than half the shipments down the Lakes. Their share of the trade may still further increase in the near future.

The differences of the two types of elevator are legal and commercial. The public terminal elevator is licensed for storage only, and its registered legal owners may

[1] See Appendix Table XX.

[2] *Report of Royal Grain Inquiry Commission, 1925*, pp. 77–80.

not buy or sell wheat as a trading concern. All grain entering and leaving the elevator is officially weighed and inspected, so that it may run to the same weights and grades in and out. A public elevator is not allowed to mix grain of different grades. It may, however, dry or clean grain on the owner's order. For all services that it renders—handling, storing, drying, cleaning, and so on—it must work under a tariff of charges established by the Board of Grain Commissioners. The private terminal elevator is not subjected to this close control. The owners of such an elevator may buy and sell grain on their own account, and may also store it for other owners. Grain going in and out of the elevator is officially weighed and inspected, but its movement within the elevator is not controlled. The private terminal elevator may therefore mix grain of different grades, in order to improve the average grade of its holding. Warehouse certificates of the public terminal elevators are guaranteed, both for weight and grade, by the Board of Grain Commissioners; those of the private terminal elevators are officially guaranteed for weight alone, and the guarantee of grade is given by the Winnipeg Grain Exchange.

At the present time (1924–25) there are eleven public terminal elevators with a combined capacity of 42 million bushels, and sixteen (principal) private terminal elevators with a combined capacity of 22 million bushels. The performance of these elevators can be judged from the record for the largest, the Northland elevator at Fort William. It contains 450 bins and will hold 7½ million bushels of wheat. It has unloaded 314 grain cars—300 or 400 thousand bushels—in twenty hours, and it can discharge its stored wheat into lake boats through eight spouts at the rate of 100 thousand bushels an hour.[1]

Before the close of navigation, grain is moved through these elevators as fast as possible, so that very little of it is held for more than the fifteen days of free storage. At this time, therefore, handling power is much more important than storage capacity. After the close of navigation, however, the case is altered, and storage capacity becomes more important. Grain is brought in by rail from the West for storage, but little is moved eastward by rail except on urgent demand. Shippers prefer to accumulate stocks at the head of the Lakes in preparation for the reopening of navigation in the spring, when another but smaller rush to market ensues.

Western grain moving east receives its final inspection for grade on leaving the elevator at Fort William and Port Arthur, and thenceforward is always handled in Canada with identity preserved, so that a cargo of Canadian wheat arriving in Europe from a Canadian port can be traced back over all stages of its journey to a terminal elevator at the head of the Lakes. (In the Canadian grain trade, the word "terminal" is applied to all elevators where final inspection takes place, and to them alone.)

Organization of the Grain Trade

Among sellers and middlemen in the market formed by the Winnipeg Grain Exchange and the terminal elevators at Fort William and Port Arthur, big organizations predominate, having several functions concentrated under a single control. These organizations may be elevator companies, milling companies, or farmers' coöperative organizations,—in all numbering about a hundred. Whatever the nature of the company, its commercial organization is very much the same. It operates a line of elevators at country points in the West, where it will buy grain from farmers on its own account or will store and ship grain for farmers who wish to retain ownership. For this latter grain it will expect to act as commission agent in the Grain Exchange. It will also buy and sell grain that does not pass through its elevators, either for commission or on private account. At the head of the Lakes it may maintain close connections with a public or private terminal elevator or both, perhaps owning a private elevator outright and a public elevator indirectly. At this point its interests usually cease. It may maintain commercial departments to

[1] *Daily Times-Journal*, Fort William, Ontario, December 13, 1924.

handle shipments of grain across the Lakes and exports of grain to Europe, but more commonly it leaves these tasks to others.

In addition to the elevator companies, there are a number of small cash grain commission merchants. These men handle on an average about 25 million bushels a year, for farmers who prefer to make independent shipments and sales.

On the buyers' side of the market, integration has not been carried so far. The three principal types of purchasers are the miller,[1] the lake shipper, and the exporter. Continual fluctuations in lake freight rates make moving of grain across the lakes to eastern storage points a specialized business. The shipper undertakes this business and delivers wheat in the east to the order of millers and exporters. Many millers in Eastern Canada buy their wheat from shippers. Many exporters prefer to operate on the seaboard in close contact with ocean shipping, and therefore choose to buy grain from lake shippers and "fobbers."[2] Others, however, both millers and exporters, prefer to go west for their grain and buy it on the Winnipeg Grain Exchange or even at country points. No divisions of function or territory are rigidly observed in the Canadian grain trade.

The Winnipeg Market

Winnipeg is the largest cash wheat market in the world and the only market in Canada for future trading in grains. Its opportunities for future trading are largely used by grain dealers, Canadian, American, and British, for the purpose of hedging; and Winnipeg is increasing in importance as a speculative market. Elevator companies which have purchased wheat at country points at once sell for cash in Winnipeg a contract for future delivery in some month in or near which they expect to receive the grain in the central market. Likewise exporters and shippers who have sold wheat for future delivery in Europe or Eastern Canada and millers who have made contracts for future delivery of flour, protect themselves against changes in the cash price by buying contracts in Winnipeg for future delivery. The months for future delivery are October, November, December, May, and July, the three months before navigation closes on the Great Lakes and the St. Lawrence, the first month of its reopening, and the last month before the new harvest.

The purchaser of "spot" wheat does not acquire a particular lot of grain of well-defined characteristics, but only warehouse receipts that give title to the necessary weight and grade of grain in store at the terminal elevators. He must accept from these elevators any delivery of grain whose weight and grade are approved by the official inspectors. Since definitions of grade are not precise, differing qualities of grain may be found within the same grade. On the whole, however, the public terminal elevators, which do storage business only and are forbidden to mix grain of different grades, deliver what may be called the average quality of the grade. To maintain uniformity of standards, the private terminal elevators, which mix grades, are required to deliver also the average quality of the grade.

Winnipeg prices for "spot" wheat are therefore always prices for the average quality of the grade, because this is what the purchaser will expect to receive; but for wheat that has not yet lost its identity in a terminal elevator a rather better price may sometimes be obtained. Two classes of purchasers, the millers and the private terminal operators, are always in the market for wheat of superior quality for grinding or mixing and will buy carloads on a sample basis at premiums ranging from ¼ cent to several cents a bushel. More than 50 million bushels of wheat thus changed hands in 1923–24.[3]

[1] Millers who operate country elevator lines, of course, purchase through that channel much of the wheat they grind.

[2] Merchants who make a practice of selling wheat f.o.b. to exporters.

[3] Private terminal elevators may take their own samples of grain sent to them for *storage* and select carloads suitable for their mixing, without the owners' knowledge, subsequently paying the ordinary market price for it or delivering grain of average quality against the warehouse receipts. This is regarded as an undesirable trade practice, since this unofficial sampling is said to enable them to escape the payment of premiums, with consequent injustice to the seller. *Report of Royal Grain Inquiry Commission, 1925,* especially pp. 84, 100–102.

Shipment to Eastern Seaboard

From the head of the Lakes to the eastern seaboard there are five principal routes.

(1) The most important and best established eastward route from Fort William and Port Arthur is the Great Lakes waterway to Buffalo. Between 80 and 100 million bushels of Canadian wheat are usually shipped this way each year. Most of the total goes on to the seaboard; the remainder is milled in Buffalo, for consumption or in bond for export. Other United States ports on Lake Erie receive much smaller consignments of Canadian wheat from the head of the Lakes. Grain from Buffalo for export is carried by rail to New York, Philadelphia, Baltimore, and Boston, in that order of importance. The new Buffalo-Albany barge canal to the Hudson River and New York, is an alternative route, but it is still in poor condition and does not carry much grain. It is strongly influential, however, in controlling railway rates.

(2) The next route in order of importance, and one that is being more and more utilized, is the all-water route to Montreal. Wheat usually makes this journey in two stages. It is carried from the head of the Lakes to Port Colborne, on Lake Erie, by lake steamers with a draft of 20 feet and a cargo capacity of 300 to 500 thousand bushels of wheat. These boats cannot, however, complete the passage to Montreal through the Welland Canal and the canals of the upper St. Lawrence, which are only 14 feet deep. The grain is therefore unloaded at Port Colborne into a transfer elevator owned and operated by the Dominion government, and is reloaded into smaller boats up to 90 thousand bushels capacity, which carry it down to Montreal. Up to 40 or 45 million bushels of Canadian wheat are thus handled, and another 6 million bushels or so are carried in small boats by continuous voyage from the head of the Lakes to Montreal. Another 10 to 15 million bushels of wheat do not go through the canal, but are unloaded into a big flour mill at Port Colborne or are distributed to the smaller inland mills of Ontario. At times also wheat is sent through the canals from Buffalo to Montreal.

(3) A third route from the head of the Lakes runs into Georgian Bay, on Lake Huron, where there are situated half-a-dozen ports for unloading grain. In the course of time, however, all but two have been practically eliminated from the competition. The survivors are Port McNicoll and Midland-Tiffin, served by the C. P. R. and the C. N. R., respectively. They are both situated on the most easterly inlet of the Bay. Each port handles from 15 to 20 million bushels of Canadian wheat a year, the greater part of which is carried by rail to Montreal. The remainder goes to Canadian and United States ports on the seaboard, or is taken by mills in Eastern Canada.

(4) On the long straight southeastern shore of Lake Huron, a single opening at a river mouth has given opportunity for the development of a grain port at Goderich and for a fourth route from the head of the Lakes. This port is served by both the C. P. R. and the C. N. R. and handles 10 to 15 million bushels of wheat a year, largely for the supply of mills in the peninsula of southwestern Ontario.

(5) In contrast to the water routes, which together carry 200 or 300 million bushels of Canadian wheat a year, the shipments by rail from Fort William and Port Arthur are very small, amounting to only 10 or 20 million bushels a year. The quantities of grain shipped direct from west to east by rail, without passing through a terminal elevator, are smaller still, being only an odd million bushels or so a year. Another route, equally unimportant, consists of a rail haul to Duluth and thence water carriage eastward.

The Great Lakes Traffic

The movement of grain on the Great Lakes is complicated by the navigation laws of Canada and the United States and by the competition of alternative cargoes. Traffic between Canadian ports is restricted to Canadian boats, and traffic between United States ports to United States boats. Traffic between a Canadian and a United States port is, however, open to the shipping of all countries.

The commodity that chiefly competes with grain in the lake traffic is iron ore, which is moved from big mines around Lake Superior to ports on the south shore of Lake Erie and thence by rail to the coalfields, smelters, and foundries of Pennsylvania and Ohio. This ore provides about two-thirds of the total tonnage of lake cargoes—40 to 60 million tons by weight. The traffic is highly and efficiently organized and the largest lake freighters, 600 feet in length and carrying 12 to 15 thousand tons of ore at a time, are engaged in the service.

Though Canadian boats are excluded from this traffic, it exerts a very powerful influence on the Canadian grain trade. In the first place, the improvement of the waterway of the upper lakes must be attributed mainly to the need for the cheapest possible transportation of iron ore. In the second, the economical design of the lake freighter has been evolved in the same service. These boats are all bulk carriers, whatever their cargo may be. Each is simply a continuous hold or series of holds, with navigating quarters forward and machinery aft. They have no loading and unloading equipment of their own, and are entirely dependent upon the elaborate handling appliances installed in ore docks, coal docks, or grain elevators at the ports they use. Presumably because they are excluded from the ore trade, Canadian boats of this type are in general considerably smaller than United States boats.

A third influence of the ore trade is that there is always an enormous reserve of tonnage on the Lakes that can undertake to carry Canadian grain from the head of the Lakes to Buffalo at any time when the demand arises and freight rates on grain increase. This regularly occurs at the opening of navigation, when special efforts are made to hurry shipments through to Europe. At the end of the season, frost causes the ore movement to cease before the close of navigation, and the United States ore boats again step into the Canadian grain trade for one or two final trips. Because of the Canadian navigation laws, because the port of Montreal opens later and closes earlier than does navigation on the upper lakes, and because it offers the quickest route to Europe, these first and last movements are directed to Buffalo.

A final relationship between the grain traffic and other traffic is found in the return cargo of lake shipping—coal, which is brought up from Pennsylvania and West Virginia to Lake Erie ports and is carried westward by grain boats and by some of the ore carriers. Even boats that have carried grain to ports on Georgian Bay may make a passage to Lake Erie in ballast to obtain a return cargo of coal for carriage to the head of the Lakes.

Eastern Grain Ports

All the eastern grain ports possess grain elevators with considerable storage capacity and equipment for unloading lake boats and for loading grain. Recent figures are given in Table 4. The storage capacity of all these lake ports is increased during the period of closed navigation by "storage afloat." Lake boats and barges bring down a last cargo of grain from the head of the Lakes and tie up at an elevator for the winter. At some time during the winter, the cargoes are unloaded into the elevator to be shipped eastward by rail when desired. Up to 10 million bushels of wheat may thus be stored at the Canadian lake ports, and 10 to 20 million bushels at Buffalo.

Table 4.—Number and Capacity of Elevators at Leading Eastern Lake Ports, 1924–25*

Port	Number	Capacity *(million bushels)*
Buffalo (1925)[a]	13	21.9
Montreal (1924–25)	4	12.26
Port McNicoll (1924–25)	1	4.2
Midland	1	3.0
Tiffin	2	5.5
Goderich	2	1.6
Port Colborne	2	3.5

* Grain Elevator Committee of Montreal, unpublished report, 1922, supplemented by information from Buffalo Chamber of Commerce; also Board of Grain Commissioners, list of licensed elevators, 1924–25.

[a] Number of elevators regularly engaged in export business. The total number of elevators in Buffalo in January 1925 was 27, with a capacity of 31.5 million bushels (Buffalo Chamber of Commerce).

In these eastern elevators and elevators at ocean ports, fobbers and exporters ac-

cumulate their stocks for shipment to Europe. Buffalo is the best place for storage, because grain can be shipped thence by rail to Boston, New York, Philadelphia, or Baltimore, or by water to Montreal, as shipping conditions at the moment dictate. Montreal offers ocean port storage for seven months of the year and inland storage for the other five. Behind Montreal and Buffalo stands a second line of storage at the Georgian Bay ports, from which grain may be shipped to Montreal or its winter outlets, or to United States ports on the seaboard. Port Colborne elevators, on the other hand, ship grain to Montreal only by the water route during open navigation, and by rail they supply only local mills.

Montreal, though it is open for only seven months of the year, has recently become the leading ocean grain port of North America. It has three distinct movements of grain. Some American export wheat, harvested in the hard winter wheat states of Kansas and Nebraska in June and July, is moved to Chicago, and thence shipped to Montreal by the Georgian Bay or the Welland Canal route. This movement is at its height from July to September and is accompanied by a similar large export movement of other grains, principally rye and corn. Next comes the major movement of the Canadian crop. Finally, when the port of Montreal is closed by ice, grain in store at its elevators and on Georgian Bay must be hauled eastward by rail to open ports on the Atlantic. These ports are St. John, N.B., served by the C. P. R., and Portland, Me., served by the C. N. R. (formerly the Grand Trunk).

Atlantic Ocean Shipment

The last stage of the export grain movement is shipment across the ocean. Because of the large number of liners plying regularly across the Atlantic, a great part of the grain is carried in these vessels. The remainder is carried largely by tramp steamers, chartered for a particular voyage. It is the custom of liners which have gained a partial cargo of freight of higher grade to offer the remainder of their space to grain exporters at any rate—an "open" or "berth" rate—that will fill their holds and avoid the necessity for taking in ballast.[1] For this reason, and because tramps can compete with liners for the carriage of grain, ocean rates on grain are omitted from the control of the North Atlantic Conference of steamship lines. Until the spring of 1924, flour rates were regularly fixed by the Conference, but since then they have passed into the category of berth rates, and are current merely from day to day.

Shipping conditions determine the degree to which each ocean port is used, within the limits of its physical capacity. Montreal and New York have been rivals for first place. New York is the principal port for liner shipments because of the number of lines running from that port and because facilities for tramp shipments are unsatisfactory there. Montreal has been served extensively both by liners and by tramps, although as a tramp port it suffers under the handicap of deficiency in inward cargoes and high rates of insurance in the St. Lawrence in the last half of the navigation season.[2] At the other American ports—notably Portland, Boston, Philadelphia, and Baltimore, particularly the last-named—extensive port facilities and ample shipping provide important outlets both for Canadian and American grain.

The Westward Route

While the bulk of the grain of Western Canada moves eastward, a westward movement through Vancouver has grown to considerable proportions in recent years. This route was impracticable before the opening of the Panama Canal in August 1914, and during the war it had little opportunity to develop because the scarcity of shipping necessitated concentration on the shorter shipping routes. Since the war, however, shipping has been more freely available, and the chief difficulties with which Vancouver must now contend are a lack of inward cargoes and the competition of exporters in the Pacific ports of the United States for outward cargo space.

[1] In Montreal, at least, the rates are fixed by a port committee of the shipping companies, which meets every day.

[2] Within the last year or so, coal has been shipped to Montreal from England. This traffic may tend to increase its importance as a tramp port.

Grain shipped to Vancouver from the prairie provinces is inspected at Calgary or Edmonton and unloaded into harbor elevators at Vancouver. Vancouver thus benefits from the advantages of a through haul by rail from the country shipping point to salt water. On the other hand, it suffers from the fact that, while eastward railway rates to the Great Lakes are kept at a low level by the Crow's Nest Pass agreement, the difficulties of westward haulage through the mountains have been made the reason for a much higher mileage rate to Vancouver. The territory which Vancouver serves varies considerably with the season of the year. In midsummer, while grain movement is small and shipping rates on the Great Lakes are low, it can attract grain only from Alberta; but in autumn, winter, and spring, when lake freights are higher or lake navigation is suspended, its territory increases and it receives grain not only from Alberta but also from western Saskatchewan.

Vancouver Harbor has been greatly improved by new construction during the last few years, and it now possesses port elevators with a storage capacity of nearly 7 million bushels. Several grain-exporting firms, Canadian and European, maintain offices in the city, and a grain exchange for cash trading has recently been opened to facilitate their trade.

In the crop year 1921–22, Vancouver exported only 8 million bushels of wheat; the next year, it exported 18 million; and in the crop year 1923–24, when Alberta enjoyed a record crop, 54 million bushels of wheat were exported; but with a much smaller crop in Alberta in 1924, the exports of the crop year 1924–25 fell off again to about 24 million bushels. The bulk of the shipments have so far been made to Europe, chiefly Great Britain, through the Panama Canal, and a much smaller proportion to China and Japan.

Vancouver serves those parts of the West which yield wheat of the best quality and highest protein content and, so far, a cleaner wheat, so that its shipments have fetched a higher price in the British market than shipments of wheat from the eastern prairies through Atlantic ports.

The movement of wheat through Vancouver will vary in close accord with the Alberta wheat crop, which is highly variable from one year to another, and to some extent also with the requirements of the Oriental market. Its future, therefore, will principally depend upon the development of wheat-growing in Alberta, in particular upon the development of the districts round about Edmonton and eastward, and also upon the progress of wheat-growing in the Peace River district.

Costs of Shipping and Marketing

In conclusion it is desirable to present a general view of the costs involved in getting wheat from Western Canada to market. On this point the Dominion Bureau of Statistics has recently made some careful estimates. For the navigation season of 1923, as shown by Table 5, freight charges from Saskatoon,

Table 5.—Estimated Average Freight Charges per Bushel of Wheat from Saskatoon to Liverpool, 1923*

(Cents)

1923	Saskatoon to head of lakes —rail	Head of lakes to Georgian Bay—water	Georgian Bay to Montreal —rail	Montreal to Liverpool—water	Total
May	14.4	4.10	8.6	6.9	34.0
June	14.4	3.71	8.6	6.8	33.5
July	14.4	2.86	8.6	7.4	33.3
Aug.	14.4	2.99	8.6	7.4	33.4
Sept.	14.4	3.54	8.6	7.2	33.7
Oct.	14.4	4.39	8.6	8.8	36.2
Nov.	14.4	3.82	8.6	10.3	37.1
Average	14.4	4.02	8.6	8.0	35.0

* *Monthly Bulletin of Agricultural Statistics*, October 1924, p. 303.

Saskatchewan (a typical central point in Western Canada), to Liverpool, amounted to 35 cents a bushel. Of this amount, 14.4 cents represented railway haul to Fort William, 4.02 cents was the average charge for water haul to Georgian Bay ports, 8.6 cents the railway charge thence to Montreal, and 8 cents the average ocean freight charge to Liverpool. It will be noted that the railway charges were constant, while the lake freight rates were at a minimum in midsummer, and the ocean freight rates were

much higher in October and November, the heaviest shipping season.

A more detailed estimate of total charges for shipping wheat from a typical central point in Western Canada to Liverpool, by an all-water route through Port Colborne and Montreal, based on rates for 1922-23 with wheat at an insured value of $1.40 per bushel, led to a total of 40 cents a bushel, distributed as follows:[1]

Freight by rail	15.00	cents
Freight by inland waters	8.29	"
Ocean freight	6.21	"
Commissions, fees, interest, etc.	8.70	"
Insurance	1.53	"
Total	39.73	cents

From Northern Pacific ports to Liverpool, ocean freight rates are two or three times those from Atlantic ports, but they vary less during the year. In the season 1923-24, for example, they were usually around 22 or 23 cents a bushel.[2] In the same season railway freight rates to Vancouver for export wheat ranged from 22½ cents per 100 pounds from Calgary and Edmonton, Alberta, to around 30 cents from points in Saskatchewan,[3] or from 13½ to 18 cents a bushel. Since from most of these points the freight charges eastward are higher than from Saskatoon, the competitive possibilities of the westward route are apparent, particularly at times when lake and Atlantic rates are high or the grain must be held in elevators beyond the period of free storage.

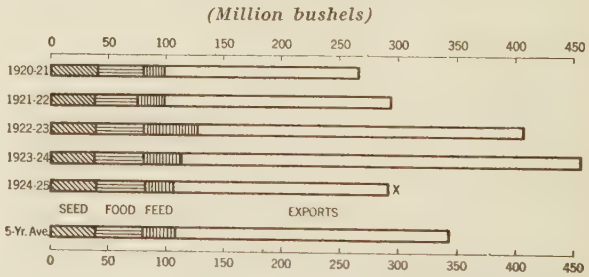
IX. CANADIAN WHEAT IN THE WORLD MARKETS[4]

Volume of Exports

Roughly two-thirds of Canada's wheat production, on the average, is exported. Official estimates of the disposition of the Canadian crops of the past five years show that roughly 40 million bushels are milled for domestic consumption; seed requirements are nearly as large; and a variable quantity averaging about 30 million bushels a year is wasted or is fed to livestock.[5] Deducting, therefore, some 110 million bushels for domestic requirements, a variable balance, which has averaged about 230 million bushels a year in the past five years, has been exported as wheat or flour.

During this 5-year period, the average exports from the United States have been approximately the same. Together the two countries have contributed almost two-thirds of the wheat entering into international trade.[6] As it happens, however, variations in individual years in the two countries have been largely compensating, so that the combined net exports have varied only within narrow limits, from about 440 to about 490 million bushels. This is due partly to the facts that Canada exports spring wheat while the United States exports chiefly winter wheat and that a favorable year for winter wheat often happens to coincide with an unfavorable year for spring wheat. It is partly due, however, to the fact that the domestic disappearance of wheat in the United States varies from year to year by much larger amounts than it does in Canada.[7] Hence when Canada has a large

Chart 8.—Disposition of Canadian Wheat Crops, 1920–24*



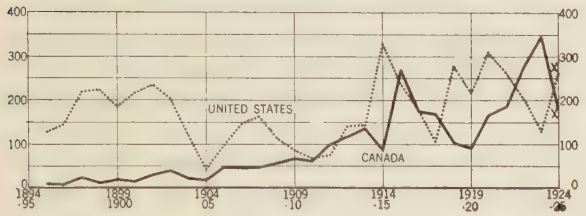
* Sources: See Wheat Studies, December 1924, p. 53, and April 1925, p. 170.
X Preliminary approximation.

[1] Details are given in *Monthly Bulletin of Agricultural Statistics*, October 1924, p. 304.
[2] Data of International Institute of Agriculture.
[3] *Report on the Grain Trade of Canada, 1924*, p. 157.
[4] For general references, see Bibliographical Notes, p. 275.
[5] See Chart 8, and Wheat Studies, December 1924, p. 53, and May 1925, p. 170. Part of the waste, of course, is "dockage," consisting of broken grain, weed seeds, and foreign material, all of which is included in the estimate of the farm crop.
[6] See Appendix Table II, and Chart 1 above, p. 218.
[7] See Wheat Studies, December 1924, p. 53.

export surplus, prices tend to be depressed to such a level as to restrict American export and to divert wheat in the United States to animal consumption; whereas, when Canada has less for export, America can profitably export more. A material decline in ex-

CHART 9.—EXPORTS OF WHEAT AND FLOUR FROM CANADA AND THE UNITED STATES, 1897–1924*

(Million bushels)



* Sources: U. S. Department of Commerce, *Monthly Summary of Foreign and Domestic Commerce;* and see Appendix Table XXIII.

NOTE.—U. S. figures are net exports; Canadian figures are total domestic exports.

x Preliminary approximation.

ports from the United States would, therefore, have considerable significance for Canada.[1]

This tendency toward constancy of the aggregate exports from the two leading exporters mitigates the effect on world prices proceeding from the variability in Canada's wheat exports. If, as seems to be the case, the trend of United States exports is downward[2] and the trend of Canada's exports is still upward, this compensating tendency is likely to be weakened before many years. Since both Australia and Argentina export, on the average, about two-thirds of their crops, and since Russian exports seem unlikely to vary inversely with Canadian exports, the indications are that as Canada's relative importance in wheat export trade increases, world export surpluses will be increasingly variable, with consequent influences upon world wheat prices.

[1] In one respect Canada gains by large grain exports from the United States. The handling of grain through the lower lakes and Montreal is cheapened because the same equipment may be used to handle American grain at certain seasons and Canadian grain at others. See above, p. 258.

[2] See WHEAT STUDIES, March 1925.

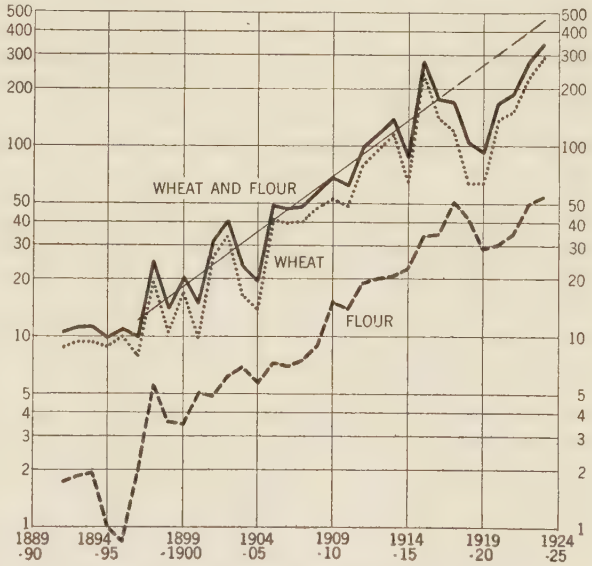
[3] See also Chart 1, p. 218, and Chart 4, p. 239, for comparison with production.

TREND OF EXPORTS

It is only since 1897–98 that Canada has been consistently important as a wheat exporter. Prior to 1892, exports never reached 10 million bushels a year, and originated largely in Ontario. In the six years ending June 30, 1897, they amounted to about 10 million bushels a year; and thereafter, until 1918, a marked upward trend was in evidence. Chart 9, above, represents this growth on a natural scale, in comparison with net exports from the United States. Chart 10 represents the same movement on a logarithmic scale, in order to bring out the rate of growth.[3] Other curves show separately the export of flour and the export of wheat as grain. A line of trend for the total exports, for the years 1896–97 to 1916–17, is added. While there was considerable variation from year to year, this trend was upward at an average rate of 14.3 per cent per

CHART 10.—CANADIAN EXPORTS OF WHEAT AND FLOUR, 1891–1924*

(Million bushels. Logarithmic vertical scale)



* Sources: See Appendix Table XXIII.

NOTE.—The equation of the line showing the trend of exports of wheat and flour, 1896–97 to 1916–17, is $\log_{10} y = .0584x + 1.0222$, taking 1895–96 as the zero year.

annum. Flour exports increased at approximately the same rate as total wheat exports.

This striking upward trend was broken in

1918–19, chiefly in consequence of two poor crops in 1918 and 1919. In the four succeeding years exports increased from this level, but even the exceptionally high figure for 1923–24 did not approach the extension of the previous line of trend. Exports for the current year are far below it.

There are no grounds for expecting Canada's exports in the future to show an upward trend as pronounced as that of 1920–24 or that of 1897–1918. The most that can be said is that a period of remunerative prices bids fair to cause some increase in Canadian acreage and production, an increase which will normally result in rising exports over the next few years, and that variations from year to year are likely to be more impressive than the upward trend.[1]

Quality

The expansion of Canadian wheat production has been promoted by the popularity of the wheat in foreign markets. This is due to inherent qualities. It is characteristically hard, of high protein-content; and even in the lower grades these qualities go far to offset other defects. It yields a strong white flour, which absorbs water freely, forms a strong, elastic dough, and yields more loaves to the barrel than weaker flours do. The resulting loaf is large and shapely ("bold"), with crust of good bloom and a crumb of good texture and good keeping qualities. Since the bulk of west European wheat is soft, and much of the wheat exported from the United States, Argentina, and Australia is either soft or semi-hard, Canadian flour, or Canadian wheat for its flour, is widely in demand for blending with weaker flours. These qualities, which were early appreciated by British millers, are now so extensively recognized that large quantities of Canadian wheat can be regularly absorbed in the British market.

[1] See further, below, Section X.

[2] The Canadian government now exchanges records with the United States government. Thus the statistical difficulties occasioned by transit shipments are being largely overcome.

Canada's Wheat Export Markets

Statistics of destinations of exports and of sources of imports are notoriously unreliable, partly because of shipments for orders, partly because the immediate source or destination is often different from the original or ultimate one. Here the situation is complicated by the fact that much Canadian wheat is exported through the United States, and its destination is not determined until after it leaves Canada.[2] Thus British statistics of wheat imports from Canada differ greatly from Canadian statistics of wheat exports to Great Britain. The statements below are based on Canadian data summarized in Appendix Table XXIV, which are sufficiently reliable for a broad view.

Great Britain has always been by all odds the leading customer for Canadian wheat. Until about 1912 she was the only important customer, taking about 90 per cent of Canada's wheat and flour exports. Particularly after Canada's three good crops of 1911–13, however, there was an expansion of other markets, doubtless attributable in part to the decline in price during those years. Thus the United States imported heavily in 1913–14. Countries of Northern Europe became considerable purchasers, for in these countries, as in Great Britain, bakers find Canadian flour of great value for blending with other flours to give strength to the mixtures. The Orient took appreciable quantities in 1913–14. And the flour exports, to a great variety of countries, increased notably in volume.

During the war, the market for Canadian wheat was further broadened, especially after the crops of 1915 and 1916. Exports of wheat and flour to France and Italy increased greatly, partly because of the decline of Russian exports, and partly because shipping difficulties affected exports from the southern hemisphere. Shipments to the United States became large, after the small American crops of 1916 and 1917, but fell to small proportions after Canada's poor crops of 1918 and 1919. Even so, in the five years ending March 31, 1919, nearly 80 per cent of

Canada's wheat and flour exports went to Great Britain.

After 1920, with large Canadian crops and low grain prices, the broadening of the market continued as exports rose. Most of the increase in exports, in fact, went to other countries than Great Britain, so that, on the average, in the five years ending March 31, 1925, only about 60 per cent of Canada's exports went to Great Britain. Under the stimulus of low wheat prices and short rice crops, the Orient took substantial quantities from the crops of 1921, 1922, and 1923.

The British market remains the mainstay of the Canadian exporter, and its relative importance has latterly increased. Russian competition will probably be felt most on the Continent, and United States and Argentine competition in Southern Europe. United States flour competes with Canadian in many markets. Oriental markets can hardly be counted upon for large orders except at low prices, because their demand for wheat is highly elastic. Since, however, Canada already exports as much wheat, on the average, as Great Britain imports, increases in Canadian exports must go in considerable measure to markets which are, on the whole, less exacting in their standards for wheat imports. Accordingly, unless the demand for the special qualities of Canadian wheats can be cultivated still more broadly, these wheats will have to meet competitive wheats simply on the basis of price and weight.

Imports into the United States

The United States affords only a limited market for the wheat of Western Canada. This is due to three related factors—the large production of wheat in the United States, the political separation of the two areas, and the tariff policies of the two countries. The northwestern states of Minnesota, North Dakota, South Dakota, and Montana yearly produce 150–250 million bushels of hard red spring wheat, practically identical in quality with that of Western Canada. Another group of states in the Middle West produces between 200 and 300 million bushels a year of hard red winter wheat, the commercial qualities of which are equal, on the whole, to those of the hard spring wheat. Exports of these two kinds of United States wheat, as grain or flour, are large, and they have been strong competitors with Canadian wheat and flour in many parts of the world. Had there been no political separation, undoubtedly there would have been a different development of transportation routes, and, with no tariff between the two areas, much more Canadian wheat would doubtless have been consumed in the United States. Nevertheless, since both countries have usually had surplus wheat for export, the aggregate net export from the two areas might not have been greatly different if the boundary line had not existed.

During most of the period of Canada's rise to eminence as a wheat exporter, the United States has maintained a substantial tariff on wheat and flour. The rates imposed by the different acts or proclamations are shown in Table 6.

Table 6. — U. S. Tariff Duties Effective on Canadian Wheat and Flour, 1883–1925*

Date effective	Wheat duty	Flour duty
July 1, 1883	20 cts. per bu.	20% ad val.
Oct. 1, 1890	25 " " "	25% " "
Aug. 28, 1894	20% ad val.	20% " "
July 24, 1897	25 cts. per bu.	25% " "
Aug. 5, 1909	25 " " "	25% " "
Mar. 1, 1914	10 " " "	45 cts. per bbl.
Apr. 17, 1917	None	None
May 27, 1921	35 cts. per bu.	20% ad val.
Sept. 21, 1922	30 " " "	78 cts. per 100 lbs.
Apr. 6, 1924	42 " " "	104 " " " "

* U. S. Tariff Commission, *Agricultural Staples and the Tariff*, 1920, pp. 18–19; and legislative acts.

Before the war these duties, while not prohibitive, were sufficient to prevent much Canadian wheat from entering the American market. The largest annual imports, in the years ending June 30, 1905 and 1912, following poor crops of spring wheat in the United States, were somewhat over 3 million bushels.[1] Such imports were high

[1] Data for United States imports from Canada are based on United States statistics.

quality or premium wheats in special demand for blending purposes. During the whole of this period very much larger quantities of United States wheat were exported.

The Underwood Tariff of 1913 offered reciprocal free trade in wheat and flour, but since Canada enforced a duty, the United States tariff carried a duty of 10 cents a bushel on wheat and 45 cents a barrel on flour. This was a small barrier, particularly with rising wheat prices. In 1915–16, despite a record United States crop, the imports exceeded 7 million bushels. The next year, with a poor United States crop, they reached nearly 25 millions. After the United States entered the war, on April 17, 1917, Canada joined in making wheat and flour reciprocally free of duty, and United States imports rose to 27 million bushels in 1917–18. Imports were small in the two following years because of the relative sizes of the crops. In 1920–21 they rose to 57 million bushels. Since in these years the United States was also a heavy exporter, the Canadian wheat then displaced, bushel for bushel, United States wheat which was sent abroad.

The emergency tariff act of May 27, 1921, reëstablished wheat and flour duties at high figures, but carried with it provisions whereby Canadian wheat could be imported practically duty-free for milling in bond in this country for export. These rates were lowered slightly in September 1922, but in April 1924, under the flexible provision of the tariff act, the President raised the rates from 30 to 42 cents a bushel on wheat and from 78 cents to $1.04 per hundred pounds on flour, but lowered the duty on mill feed from 15 to 7½ per cent ad valorem.[1]

Even after May 1921, large quantities of Canadian wheat were imported—in 1921–22 over 17 million bushels, in 1922–23 nearly 20 millions, in 1923–24 nearly 28 millions. Of these, substantial amounts were imported in bond; but in 1923–24, after an excellent Canadian crop and a poor United States crop, some 13 million bushels, largely premium wheats, were imported over the tariff for consumption. In 1924–25, when crop conditions were reversed, little Canadian wheat was imported, and almost all of that for milling in bond.

If the United States tariff is maintained at such high figures, little Canadian wheat may be expected to enter the United States for domestic use except in years of small crops of spring wheat or of spring wheat and hard winter wheat combined. But so long as the practice of admitting Canadian wheat duty free for milling in bond is maintained, imports for this purpose may be expected to continue large except when, as in 1924, Canada has a poor crop and the United States an excellent one—unless indeed Canada imposes a threatened countervailing export duty.

If the tariff should be materially reduced, large quantities of Canadian wheat would find their natural markets in eastern milling centers, and larger quantities of United States wheat, particularly in the southwest, would be exported instead of moving north and east for domestic milling.

Canada's Export Flour Trade

The flour exports of Canada, like the trade in wheat as grain, have grown rapidly. The 5-year pre-war average exports were less than 4 million barrels. Exports increased greatly in the first years of the war, fell off after 1918, and recovered after 1921. In the crop year 1923–24 the flour exports were about 12 million barrels, the equivalent of about 54 million bushels of wheat.[2] This is considerably more than Canada's domestic consumption of flour, which, as already mentioned, is around 40 million bushels.

The character of this export trade is much the same as in the case of the United States.[3] There are the same three basic characteristics—wheats of high quality, a milling capacity in excess of domestic requirements, and a home market that will utilize only high-grade flours. Consequently, there are the same three kinds of export. The first is an export of high-grade flours, which are esteemed in temperate climates for their baking quality and in tropical climates for their keeping quality. The

[1] The result was an increase in imports of mill feed, from 125,556 tons in the last year under the old duty (April 1, 1923, to April 1, 1924,) to 257,264 tons in the following year, largely into the northeastern states.

[2] See Appendix Table XXIV, and Chart 10, p. 261.

[3] See Wheat Studies, March 1925, pp. 127 ff.

second is an export of average flours which are ground in order to keep the mills at work after domestic needs have been supplied. The third is a nexport of low-grade flours, which appear as a by-product of the manufacture of better flour for domestic use, and which are sold to foreign markets where cheapness is the controlling consideration. Differences between the flour trade in the United States and Canada also exist, because Canadian mills are much more largely dependent upon the export trade and because they do not possess such good markets for their mill feed. The Canadian millers also complain that they are hampered by high transportation costs on wheat from western farms to eastern mills and on flour from the mills to the European market, and by the Dominion tariff on milling machinery and containers. Neither does the Canadian wheat tariff accord the privilege of milling in bond, which is of importance to American millers.

The seasonal character of the Canadian grain movement imposes itself strongly upon the mills and their markets. Appendix Table XXVI indicates the monthly variations in wheat grindings in the past five years. In October and November the mills work at their hardest. Their rated capacity in 1924 was about 130,000 barrels a day, or from 3½ to 4 million barrels a month.[1] Even in the busiest months of the year, however, their actual performance comes to only two-thirds or so of this nominal capacity, and during the summer months it falls to a third or a quarter.[2] This seasonal variation affects milling both for domestic consumption and for export. The climatic factor also operates in yet another way by creating a seasonal demand for mill feed during the winter, when pasture is not available for livestock. Nevertheless the number of livestock in Canada is not sufficient to consume all the mill feed that Canadian mills produce, so that a portion of it is sold irregularly in the United States for what it will bring.

The great expansion of the Canadian flour trade has taken place in a period when European millers were affected by low European crops and disorganized trade conditions. Germany, which before the war was a large net exporter of flour, has been a net importer since the war. Flour exports from Hungary and Roumania have been much reduced. Italy has only recently regained her flour markets abroad. In the first three years after the war, Great Britain's net imports of flour were abnormally large. Moreover, both the United States and Australia have substantially expanded their flour exports since pre-war days.[3] In the Oriental market, there has been a notable development of milling capacity in port cities. With the return to more stable equilibrium in Europe, and the passing of conditions which have militated against tariffs on foodstuffs, the European demand for import flour is likely to decline, and Canadian millers must meet competition not merely from wheat exporters but from wheat-importing countries.

On the other hand, Canadian flour enjoys an advantage in European markets over flour produced there from Canadian wheat, from the fact that it reaches the importing country in a "mature" state, ready for use by the baker. The advantage of this to the Canadian miller is often equivalent to a difference of several cents a bushel in the purchase price of the wheat.

Seasonal Flow of Exports

There is a pronounced seasonal variation in Canadian wheat exports as well as in the internal movement of Canadian wheat.[4] The heavy movement from the farms begins in September, reaches a peak in October, and is largely completed in December. The receipts at the head of the Lakes follow shortly, also with a peak in October. Exports, however, first attain large volume in October, and are at their height in November and December. From January through April, exports are small because of the closing of navigation on the Great Lakes and the St. Lawrence. In this period the

[1] The official statistics on this point have been severely criticised for including a number of small obsolete mills which have now gone practically out of business. *Northwestern Miller*, June 10, 1925, p. 1066.

[2] At the time of writing, it is reported (*Canadian Milling and Grain Journal*, June 1925) that all the flour mills in Western Canada are closed down, for both domestic and export trade.

[3] See Wheat Studies, December 1924, p. 55.

[4] See Chart 11, p. 266, and Appendix Table XXVII.

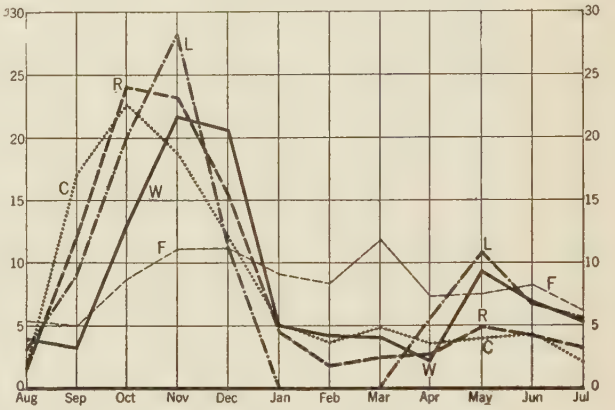
eastward grain movement is made by rail haulage from the stores accumulated at Montreal, Buffalo, and Georgian Bay ports to open seaports on the Atlantic coast; and the westward movement through Vancouver increases. In May and June, after navigation has been resumed, there is an increase in the eastward movement, though it is much smaller than in November and December. Canadian exports in July are usually larger than in August or September (when United States wheat is moving through Montreal most freely) or in the season of closed navigation. The flour export is much less irregular than the export of wheat grain, but shows roughly the same high and low months with a single important exception. In every one of the four years covered by Chart 11, flour exports in March were higher even than in November and December. The greater regularity of the flour export is due to the fact that flour can bear the higher costs of rail shipment. The high export in March perhaps anticipates the greater demand by bakers for strong flour during the summer months. On the average, about 50 per cent of Canada's wheat and flour exports leave the country in the last three months of the calendar year.

The flow of Canadian wheat into the import markets abroad is much less irregular than the export from Canada. Much of the wheat which leaves Canada in October, November, and December is exported through the United States, and leaves American ports some weeks after it leaves the Canadian border. Hence foreign imports of Canadian wheat are not so heavy in November, December, and January, and are heavier in February, March, and April, than would be suggested by the monthly variations in Canadian export statistics.

The seasonal variation in exports has important bearings on wheat prices. On the whole, wheat prices in Canada are at a seasonal minimum in October and November, and Canadian wheat prices in Liverpool are at a seasonal minimum in these months. During the winter months the margin between Canadian wheat prices in Liverpool and in Canada is increased, because of heavier shipping costs. In the spring, as this margin declines, prices in Canada tend to be higher, reaching their seasonal maximum before United States winter wheat comes to market in July, or later if this crop is small. Liverpool prices of Canadian wheat reach a seasonal maximum at the same time. British millers' offers for Canadian wheat are doubtless influenced by the rate at which they grind it and the costs of holding it in store for grinding. There can be but little doubt that their rate of grinding from month to month is considerably more uniform than the rate of shipment across the Atlantic.

CHART 11.—SEASONAL VARIATIONS IN CANADIAN WHEAT MOVEMENTS*

(Monthly percentages of annual averages, 1920–21 to 1923–24)



* Sources: See Appendix Table XXVI.
C — Cars loaded in Western Canada.
R — Receipts at Fort William and Port Arthur.
L — Lake shipments from Fort William and Port Arthur.
W — Wheat exports.
F — Flour exports.

X. THE FUTURE OF CANADIAN WHEAT PRODUCTION AND EXPORT

Canada's future as a wheat producer and exporter cannot be forecast with confidence or precision: scientific, technological, economic, and political factors are too numerous and complex. Nevertheless, the foregoing analysis justifies a reasoned consideration of the outlook in connection with Canadian wheat for at least the next few years.

The Price of Wheat

A powerful influence will be exerted by the world price of wheat. From 1921 to 1924 Canada's wheat acreage declined slightly, primarily because of the depressing influence of low wheat prices. This year, in spite of distinctly higher prices for the 1924 crop and hopes of good prices for the 1925 crop, acreage has not increased much, if at all. Past experience has shown, however, that the acreage planted in any given year is materially influenced by weather conditions affecting fall plowing and spring seeding and cultivation, and that after a prolonged period of low prices (as in the 'nineties) more than one year of good prices is necessary to remove the depressing influences. There seems no doubt that a second year of good prices would set in motion forces making for substantial increases in Canada's wheat acreage.[1] If past experience is a safe guide, such an increase of acreage is likely to persist for several seasons, even if prices should again decline.

The future of world wheat prices is especially difficult to forecast because of uncertainty concerning Russia as a wheat exporter. The growth in Canada's export since 1914 has largely replaced Russia's pre-war contributions to the world market. The United States wheat exports seem likely to decline. India seems unlikely to be of increasing importance as a wheat exporter. No rapid increase in exports from Argentina and Australia can be anticipated. Recovery of wheat production in southeastern Europe bids fair to be slow. But Soviet Russia has large potentialities for production, and is under great economic pressure to export heavily of wheat and rye in order to pay for essential imports, even though the Russian people are ill-fed. Russian acreage has been increasing since the economic collapse following the Revolution. Conditions for agricultural production are not highly favorable but, on the whole, are improving. Recovery is showing itself first in an increase of exports of dairy produce, which compete strongly with similar Canadian exports. Railway transportation, though unsatisfactory, is not proving a serious handicap. The return of Russia as an important exporter of wheat seems only a matter of years, and in any of the next few years favorable weather conditions may result in considerable Russian exports.

The prospect of increasing competition from Russia may well be taken into account in any tendency to expand Canadian wheat acreage, since large quantities of Russian grain of customary quality on the world market might seriously depress Canadian prices. On the other hand, there has been since the war a considerable expansion in wheat consumption from the low level to which it dropped during the war. Further increases are in prospect, as Europe recovers her financial and economic equilibrium. While in part these will be met by increased production in Europe itself, a persistent demand for import wheat must be anticipated. Especially if United States exports decline, there may well be a remunerative market for larger exports from Canada and Russia.

On the whole, it is reasonable to assume that the low level of wheat prices of 1922–24 will not soon return for any prolonged period, though it may in single years, and that this obstacle to Canada's expansion will be removed if it is not replaced by a moderate stimulus. It is worth recalling that the great expansion of Canadian wheat acreage before the war, from 1900 to 1913, took place when wheat prices were, for the most part, on a moderate level.

Potential Wheat Acreage

Numerous estimates of Canada's potential wheat acreage have been made. Already the Canadian wheat area is larger than was predicted by several observers in years past. Thus Sir William Crookes, in his admonitory presidential address to the British Association in 1898, endorsed predictions that the acreage might expand to 6 million acres by 1910, and to 12 million by 1923.[2] On the other hand, the acreage is still far short of that suggested by other

[1] The crop bulletin of the C. N. R., dated June 1925, speaks of a considerable advance in new breaking in Alberta.

[2] Sir William Crookes, *The Wheat Problem*, London, 1899 and 1917.

experts.[1] Dr. O. E. Baker, of the United States Department of Agriculture, recently estimated Canada's potential wheat area at 80 million acres, yielding an average of 17 bushels per acre, a potential crop of 1,360 million bushels—probably by far the highest serious estimate yet made.[2] Such estimates have a certain interest, particularly to those concerned with food as a factor limiting the growth of population, but they afford little basis for judgment concerning the next few years. For this purpose one must examine the practical possibilities of early expansion.

Including land in summer-fallow, which is largely seeded to wheat in the following year, over 31 million acres of land in the prairie provinces are now annually devoted to wheat, in addition to about a million acres in other Canadian provinces. The future extension of wheat acreage may take place (1) in new farms by extending cultivation to the north of the present area, (2) in new farms by the occupation of unoccupied or unimproved land within the present settled regions, (3) in existing farms by bringing into cultivation unimproved land, or (4) in existing farms by devoting to wheat some of the improved land which has not been seeded to wheat in recent years because of unremunerative wheat prices.

North of the present settled regions there is a large area of government land available for homesteading. The expansion northward is limited by three main factors. The land is largely bush land, which is expensive to clear. It is largely outside the present railway net and can be utilized only as new lines are extended to reach it. It is, on the whole, land with a more rigorous climate and a shorter growing season, which can be used for wheat with greater risk and with less advantage unless new wheat varieties adapted to it are developed. None of these barriers is insuperable, provided a higher level of wheat prices obtains in the next few years; but combined they present so great difficulties that no rapid extension of settlement can be expected. The railway problem, in particular, is unlike that which has prevailed for many years: after the main transcontinental lines were constructed, the railways were mainly concerned with building feeders to supply traffic; whereas the new development would call for more substantial extensions, of uncertain promise, which the established lines are hardly in a financial position to construct.

There is, indeed, in the Peace River district of northwestern Alberta, an area of more open country already connected by a long leased line to the main system of the C. P. R., and to this district settlers are encouraged to resort.[3] Some official reports indicate that large areas are excellently adapted to wheat-growing, but reports of this kind may perhaps be over-optimistic. Certainly, unfavorable reports by official investigators have not been given adequate publicity. Whatever its future, this district cannot add greatly to the Canadian wheat crop in the next few years.

In the present broad area of settlement, the government lands have been almost wholly taken up, but much of the land is still unoccupied. At present all authorities agree in advising immigrants and other settlers with sufficient capital that they stand a better chance of success by purchasing land in the region already settled than by taking up homesteads in the less favored districts where it is still available. There is at the present time in the West an area of about 32 million acres of unoccupied land in private ownership, of which from 20 to 25 million acres are commonly said to lie within fifteen miles of a railway. Much of this land lies in districts which settlers have hitherto avoided and is presumably regarded as more or less unsuited to wheat-growing. Probably not much more than 10 or at most 15 million acres of privately-owned, unoccupied land is now to be regarded as suitable for wheat-growing and within convenient reach of a railway.

The settlement of these unoccupied lands depends upon one or more of three factors, —the development of new varieties of

[1] See James Mavor, *Report to the Board of Trade on the Northwest of Canada*, Cd. 2628, 1905, for five detailed estimates by various authorities.

[2] O. E. Baker, "The Potential Supply of Wheat," *Economic Geography*, Worcester, Mass., March 1925.

[3] F. H. Kitto, *The Peace River; Its Resources and Opportunities*, Natural Resources Intelligence Service, 1922.

wheat, the building of roads, and a level of wheat prices which may tempt the application of labor and capital to these lands recently considered to be below the margin of profitable cultivation. In any event, the occupation of such lands is not likely to progress rapidly.

It is therefore reasonable to assert that expansion of wheat acreage during the next few years will occur chiefly in the land now in farms. Of a farm area of 88 million acres in the prairie provinces, 32 million acres are classed as "unimproved, in natural pasture."[1] While much of this land is unsuitable for wheat-growing or will continue to be required as pasture for livestock, there are still many opportunities for the expansion of wheat acreage by breaking new ground in grain-growing farms. The new breakings of the last few years, estimated at roughly a million acres a year,[2] have not caused any advance in the yearly estimates of acreage in wheat, presumably because of low wheat prices. If, however, wheat prices should remain on a more remunerative level, expansion here, some of it fairly rapid, will supply the principal additions to Canada's wheat acreage for several years to come.

Diversification

Opposed to the expansion of wheat-growing is the tendency toward mixed farming. The last few years have emphatically shown the financial insecurity of concentration on wheat. It leads further to the evils of weeds, soil drifting, and soil exhaustion, with attendant declines in yield, increase in farming costs, or both. Well-developed methods of mixed farming would remedy these ills and bring larger yields per acre.

There is a strong impulse toward expansion of animal husbandry in the prairie provinces. Several factors retard it. The farmer is under strong pressure to raise cash crops, like wheat, in order to meet his taxes, interest, and often instalments on his mortgage or the purchase price of his land. The American tariff, ocean freight rates, and British regulations seriously restrict his markets for livestock and animal products. Prices of livestock have been depressed, and the farmer has been in a poor position to obtain additional capital for the purchase of livestock and for equipping his farm to care for it. The maintenance of Canadian railway rates on grain and grain products at a low level, by means of the Crow's Nest Pass agreement, serves as an indirect subsidy to grain-growing at the expense of more diversified farming.[3] Accordingly the tendency toward diversification has not made rapid headway, although in Manitoba it has been influential in preventing any material expansion in wheat acreage for many years.

With the passing of the agricultural depression, certain of these obstacles will be of less importance. In the past, however, the movement toward mixed farming in Western Canada has always been most closely associated with the decline of prosperity and the existence of depression, and grain-growing has revived when recovery came. At the present time, when no such large incursion of fresh settlers who *must* grow wheat is to be expected, the results may be different; and for the next ten years or more, the development of a better-balanced system of agriculture seems probable. On the whole, increased diversification is not likely to exert a decisive influence on Canada's *wheat* production in the next few years. If it progresses, a favorable effect on yield per acre may offset the consequences of a restricted acreage.

Further increase in the agricultural production of Western Canada, either from crops or livestock, must depend largely upon the character of the farmers themselves. There are probably many backward settlers and communities in the West, whose methods of farming are of little profit to themselves and do positive harm to their neighbors. Much has been done in the past and is now being done by the provincial governments to spread a knowledge of sound farming methods throughout their territories. Though their projects have enjoyed great success, there still remains a

[1] *Sixth Census of Canada*, 1921; *Census of Agriculture*, Bulletin No. 11.

[2] See Appendix Table XV.

[3] On this point, see a speech by the Hon. L. McMeans (Manitoba) in the Dominion Senate, June 9, 1925.

strong need for further work in very difficult places.

Tariff Influences

Canadian wheat production is materially influenced by the tariff policies of Canada and the United States. The Canadian protective tariff doubtless tends to raise the cost of many articles the farmer needs to buy, whether they are imported over the tariff or produced at higher cost in Canada. But this influence is common to all Canadian producers, and probably does not operate to the peculiar disadvantage of the wheat grower.[1]

The United States tariff on wheat largely prevents access of Canadian wheat to a neighboring market, and enables certain United States producers to raise wheat when they could not profitably do so otherwise. The high United States tariff operates strongly in certain years, such as 1923–24, when the United States has a poor crop of high-grade wheat and Canada an excellent harvest;[2] and also in certain seasons of every year, when the close of navigation renders expensive the export of Canadian wheat. The Canadian tariff on flour restricts the import of United States flour. Undoubtedly the two tariffs prevent the reaping of the full advantage of economies in wheat production, transportation, and milling, by both countries. Nevertheless, the average costs of raising spring wheat in the two countries are not widely different,[3] and so long as both Canada and the United States are exporters of representative wheats, neither world prices nor Canadian prices are greatly affected by this tariff.

On the other hand, the American tariff on livestock and dairy products, which could be marketed from Canada much more easily in the United States than abroad, tends to check the expansion of this element in Canadian farming. In this way it tends to promote concentration upon staples easily marketed abroad, notably wheat. This influence of the tariff is, and may be expected to remain in the near future, stronger in promoting than in restricting wheat cultivation.

Influences Favoring Expansion of Acreage

A study of the trends of wheat acreage in the prairie provinces shows that, if past tendencies continue, the acreage in Manitoba is more likely to decline than to increase, and in Saskatchewan and Alberta the rate of increase will be lower in the future than in the past. In these two latter provinces, with a remunerative level of wheat prices, a variety of influences favorable to expansion of wheat acreage are likely to be called into play.

The railways are interested in the expansion of wheat-growing, for a threefold reason. They still have some land to sell; they seek additional grain traffic; and they stand to gain from expansion of towns and cities in Western Canada. Hence they are selling lands to settlers on terms of easy payments. This influence has not been strong in recent years, but is likely to be felt anew if wheat prices remain at a remunerative level.

Canada emerged from the war with a heavy burden of debt, the interest charges on which necessitate much heavier taxation than before the war. Such charges doubtless bear heavily upon Canadian producers, but in no special degree upon wheat growers directly. The existence of this debt leads the Dominion government to seek to expand the productive population of the country, so that the burden may be more easily borne. A vigorous campaign for immigration and settlement, with strong emphasis on wheat-growing as an opportunity for the settler, has been undertaken.

[1] A statement of western opinion may be quoted here: " . . . the farmers of Western Canada, and the western townspeople who are dependent on them for their livelihood, see the prices of the varied goods which modern industrial economy compels them to buy enhanced by tariff duties. They see indications that the profits of those who own the factories are also enhanced. They see the products of these factories sold abroad, when competition compels, at lower prices than they themselves can buy them. And they smart under a sense of injustice. Forced to accept for their own products prices fixed by competition in the open markets of the world, they are compelled to buy for their own needs at prices increased by deliberate legislative action." A. E. Darby, Director of Economic Research for the Canadian Council of Agriculture, "The Western Viewpoint on the Tariff," *The Listening Post*, Montreal, March 1925.

[2] See Wheat Studies, December 1924, pp. 37, 42.

[3] See Wheat Studies, May 1925.

Whether or not this campaign will prove successful, it is not yet possible to say.

These considerations may also influence the Dominion government in important policies affecting transportation facilities. A new canal (the Welland Ship Canal) is now being constructed by the Dominion government and will probably be completed in 1929. The largest freighters on the upper Lakes will then be able to descend to Lake Ontario. An international joint Board of Engineers is also considering at the present time the principal technical problems involved in the construction of a similar deep waterway down the upper St. Lawrence, from Lake Ontario to Montreal.[1] It is confidently asserted that this waterway, when completed, will reduce by several cents per bushel the cost of shipping wheat from Western Canada to the eastern seaboard and will thus tend to reduce the margin between the Liverpool price and the Winnipeg price or the farmers' price.[2] While negotiations are not yet concluded, and in any event some years would be required for construction, a favorable decision on this proposal might well stimulate wheat-growing in Western Canada in advance of the completion of the waterway.[3]

In general, Canada's development is not likely to be seriously restricted by lack of capital. Her credit, both public and private, is excellent, and she enjoys ready access to the American capital market. There is clear prospect of a considerable surplus in the United States for investment abroad, from which Canada can borrow to supplement her domestic resources, on far better terms than most other foreign countries.

Canada herself has the population resources adequate for much new settlement. Even before the war the growth of population in the prairie provinces was due far more to natural increase and to migration from Eastern Canada than to immigration from the United States and Europe. During the war this was even more distinctly true, because European immigration was checked, and some immigrants returned to fight. Since the war, by reason of agricultural and industrial depression in Canada, immigration has been only about a third or a fourth of its pre-war volume, and there has been considerable emigration to the United States.[4] Canada still warmly welcomes the immigrant, and once the depression is clearly past, she may receive a larger accession of population from abroad.[5] Nevertheless, it is hardly to be expected that the tide of settlement will again flow so strongly as it did from 1903 to 1912. Good land is no longer available in abundance for occupation on easy terms. Prices of railway lands are over 15 dollars an acre for poorer lands than were selling for less than 4 dollars an acre before 1904, so that the newcomer must either possess more capital in the beginning or face a much longer period of indebtedness than in the days of cheaper land before the war.

Variations in Crops

Marked variations in Canada's wheat production and export may be expected to continue. Her wheat is predominantly spring wheat. The acreage planted depends to a considerable extent upon the weather, more land, for instance, being sown to wheat in an early spring. Where a single crop enjoys the predominance of spring wheat in Western Canada, the yield per acre is especially prone to variation, under the influence of summer rainfall, temperature and sunshine, weeds, insects, plant dis-

[1] Instructions to the Joint Board of Engineers on the St. Lawrence Waterway, issued by the governments of Canada and the United States, April 23, 1925. *Engineering News-Record*, New York, April 30, 1925.

[2] It is not certain that the completion of this improved waterway will cause any reduction in rates of transportation. Even if it does, it still remains uncertain whether such reduction will repay the governments of the two countries, either directly or indirectly, for the heavy expenditures involved.

[3] Another favorite project of the West—the completion of the railway from Le Pas, Manitoba, to a port on Hudson's Bay and the development of a shipping route to Europe through Hudson Strait—is regarded much less favorably by the rest of Canada. It does not seem likely to be opened up in the near future, and, even if it is, the chances of its success at the present time appear to be but small.

[4] Unfortunately it is impossible to determine the extent of this emigration. The United States statistics of immigration from Canada are believed to understate the movement, and Canada does not compile emigration statistics.

[5] If immigration were greatly restricted, it is possible that many thousands of Canadians now domiciled in the United States would be drawn back to Canada during the next few years.

eases, weather conditions before and during harvest, and the onset of frosts at the end of the growing season. The farther wheat acreage is extended beyond its present limits, for whatever reason, the stronger this tendency to variation in yield is likely to become, as the risks to wheat-growing become steadily more intense.

Conclusion

In short, Canada has large potentialities for increase in wheat acreage. Expansion of wheat acreage will be favored by railway interests and governmental policies, by the expansion of population through natural increase and immigration, and by the availability of capital. Expansion will probably be stimulated by a level of wheat prices even lower than that which prevailed in 1924–25, and once made, increases are not likely to be reversed. It will be moderated by the prospect of the return of Russia as an important competitor in the world's markets and by the fact that the new lands available for wheat culture are on the whole less favorable than those previously devoted to wheat. The average yield of wheat in the next few years is not likely to reach the high levels of pre-war days, and may decline still more unless diversified farming develops and maintains yields by good methods, at the expense of larger acreage. Canada's wheat crops and wheat exports will continue to fluctuate greatly from year to year. On the average, both may be expected to increase over the next few years, but it is doubtful whether Canada's average exports will increase in the next ten years by more than 100 million bushels over the average of 1920–24. In view of the probable expansion of European requirements, and of the downward trend of American exports, and even in the light of a probable increase in Russian exports, such increase is far from momentous.

APPENDIX

BIBLIOGRAPHICAL NOTES

The following references specify the principal works which have been consulted in the course of this study. They do not, however, represent a comprehensive bibliography of the economic development of Western Canada.

Physiographic Conditions

Relief and Soils. The original work of investigation has been performed by the various official surveys of the Dominion of Canada, and the most authoritative statements of their results are probably to be found in the publications of the Geological Survey. Convenient summaries are available in many issues of the *Canada Year Book.* A valuable atlas of Canada was published by the Department of the Interior in 1915, and numerous maps more recently issued by the Natural Resources Intelligence Service supplement the information it contains.

Climate. The most important publications of which use has here been made are: (1) A. J. Connor, *The Temperature and Precipitation of Alberta, Saskatchewan, and Manitoba,* Dominion Meteorological Service, 1920 (maps separate); (2) articles by Sir Frederick Stupart (Director of the Dominion Meteorological Service) and tables in various issues of the *Canada Year Book;* (3) *Physical and Climatic Map of Manitoba, Saskatchewan, and Alberta* (showing average rainfall and average length of growing season), Natural Resources Intelligence Service, 1924 (preliminary edition).

Vegetation. The maps of the *Dominion Atlas,* 1915, and the Natural Resources Intelligence Service have been used as references in this section, comparisons being made with the large-scale maps of the Dominion Topographical Survey, new series (so far as published). An article by the late Mr. J. M. Macoun, "The Flora of Canada," in the *Canada Year Book* for 1922–23, gives an authoritative statement concerning the types and distribution of vegetation in Canada. The information given by these authorities has been supplemented on special points from other sources and by personal observation.

Agricultural Practices

The three authoritative works on agriculture in Western Canada are: (1) Seager Wheeler, *Profitable Grain Growing,* 1919; (2) John Bracken, *Crop Production in Western Canada,* 1920; (3) John Bracken, *Dry Farming in Western Canada,* 1921—all published by the *Grain Growers' Guide, Ltd.,* Winnipeg. Numerous bulletins and reports published by the Dominion and Provincial Departments of Agriculture and the Provincial Colleges of Agriculture supplement this information in many ways and upon many important points. A. H. R. Buller, *Essays on Wheat,* New York, 1919, gives a detailed history of wheat varieties in Western Canada.

The Transportation of Wheat

Two brief histories—O. D. Skelton, *The Railway Builders* (Chronicles of Canada, XXXII), Toronto, 1916, and S. J. McLean, "National Highways Overland," *Canada and Its Provinces,* X, Toronto, 1914—give general summaries of the building of Canadian railways but pay little attention to the relation between transportation and production. The same criticism applies to H. A. Innis, *A History of the Canadian Pacific Railway,* London and Toronto, 1923, which is written primarily from the investor's standpoint. Unlike the other two books, it contains many references. The history of Canadian waterways has been written by M. J. Patton,—"Shipping and Canals," *Canada and Its Provinces,* X, Toronto, 1914.

Official sources of information are to be found in the yearly reports of the Departments of Railways and Canals, Public Works, and Marine and Fisheries, and of the Board of Railway Commissioners. Yearly reports, *Railway Statistics* and *Canal Statistics,* are published by the Department of Railways and Canals. Special reports run thus:

Royal Commission on Railways, 1888. (Dominion Sessional Papers, No. 8A, 1888.)

Railway Rates Commission, 1895. (*Ibid.,* No. 39, 1895.)

Reports upon Railway Commissions, S. J. McLean, 1899 and 1902. (*Ibid.,* No. 20a, 1902.)

Royal Commission on Transportation, 1903. (*Ibid.,* No. 19a, 1906.)

Royal Commission on Railways and Transportation, 1916. (*Ibid.,* No. 20g, 1917.)

The history of the Great Lakes waterway and its adjuncts must be traced through United States and State of New York publications, of which much the most important are the Annual Reports of the Chief of Engineers, U. S. Army.

Other sources that have been consulted where available are the reports of railway companies and the periodical literature of the subject. *Poor's Manual of Railroads,* New York, yearly since 1868–69, and *The Canadian Annual Review,* Toronto, yearly since 1902, give much information of value.

The references given in the following section also contain many facts of importance upon the subject of transportation.

The Marketing of Wheat

This subject can be followed most easily through the reports of several successive Royal Commissions, as follows:

Royal Commission on the Shipment and Transportation of Grain, 1900. (Dominion Sessional Papers, Nos. 81 and 81b, 1900.)

Royal Commission on the Grain Trade of Canada, 1906. (*Ibid.,* No. 59, 1908.)

Elevator Commission, Province of Saskatchewan, 1910.

Grain Markets Commission, Province of Saskatchewan, 1914.

Royal Grain Inquiry Commission, 1924. (Dominion Sessional Papers, No. 35, 1925.)

The three statutes, "General Inspection Act, 1874," "Manitoba Grain Act, 1900," and "Canada Grain Act, 1912," should be read in combination with these reports.

The earlier reports of the Board of Grain Commissioners, which have been published yearly since 1912, also give valuable information. From 1902 to 1916, a yearly return—"Grain Statistics of Canada"—was published in the report of the Department of Trade and Commerce. Since 1918, a similar *Report on the Grain Trade of Canada* has been published yearly by the Dominion Bureau of Statistics in collaboration with the Board of Grain Commissioners.

From the commercial point of view, the history of the Winnipeg Grain Exchange is briefly given in the *Report on the Winnipeg Grain Exchange,* 1921, which was prepared for an abortive Royal Commission of that year. Likewise, the history of the terminal elevators is given, with some apparent inconsistencies of no great importance, in *The Canadian Lake Public Terminal Elevators,* 1918, prepared and published by the public terminal elevator companies at Fort William and Port Arthur.

The story is given much more fully, and from the farmers' standpoint, in Hopkins Moorhouse, *Deep Furrows,* Indianapolis, 1918. L. A. Wood, in his *History of Farmers' Movements in Canada,* Toronto, 1924, draws upon *Deep Furrows* in certain places, and tells the whole story in a masterly manner. The Institute has not had an opportunity to consult *Agricultural Coöperation in Western Canada* by W. A. Macintosh, (Queen's University Studies, II), Toronto, 1924.

Historical studies have also been written by D. A. MacGibbon, "Grain Legislation Affecting Western Canada," *Journal of Political Economy,* XX, 1912; Edward Porritt, "Canada's National Grain Route," *Political Science Quarterly,* XXXIII, 1918; and W. C. Clark, *The Country Elevator in the Canadian West,* Bulletin No. 20, Department of Economics, Queen's University, Kingston, Ont., July 1916.

Three studies which describe the condition of the grain trade as it existed before the development of the wheat pools are: C. B. Piper, *Principles of the Grain Trade of Western Canada,* Winnipeg, 1917; A. H. R. Buller, *Essays on Wheat,* New York, 1919; and Theodore Hammatt, *Marketing Canadian Wheat,* United States Department of Commerce (Trade Information Bulletin No. 251), 1924.

The history of the wheat pools can be followed through the *Chairman's Report of the Canadian Wheat Board,* 1921; a *Report on Wheat Marketing,* by James Stewart and F. W. Riddell, Province of Saskatchewan, 1921; the *Canadian Annual Review;* the Dominion and provincial statutes; and current periodical literature. It has been summarized briefly in an article by C. R. Fay, "The Canadian Wheat Pools," in the *Economic Journal,* XXXV, March 1925.

Progress of Settlement and Wheat Production

The political history of Western Canada has been described in a number of works, but the history of settlement has received even less attention than the history of transportation. The best sources of information consulted in the preparation of this study were the Dominion Sessional Papers, which contain the yearly reports of Dominion Land Agents, Dominion Immigration Agents, Dominion Land Surveyors, and the Commissioner and Superintendents of the Royal Northwest Mounted Police. All these reports are to be found in the reports of the Department of the Interior, with the exceptions that the reports of the Dominion Immigration Agents were included, until 1892, in the reports of the Department of Agriculture and the reports of the Royal Northwest Mounted Police were printed as separate papers from 1887 onward. A long and most interesting account of early conditions is contained in John Macoun, *Manitoba and the Great Northwest,* London, 1883.

The progress of settlement and agriculture during the period of rapid advance, 1897–1914, can be followed in three studies by Professor James Mavor (University of Toronto):

(1) *Report to the Board of Trade on the North West of Canada, with special reference to Wheat Production for Export* [Cd. 2628], London, 1905; (2) "Agricultural Development in the North West of Canada, 1905 until 1909," in *Report of the Seventy-Ninth Meeting of the British Association for the Advancement of Science, Winnipeg, 1909,* London, 1910; (3) Chapter VI of the *Oxford Survey of the British Empire,* IV *(America),* Oxford, 1914. Many instructive comments on developments during this period are to be found in the pages of *The Economist,* London.

A good record of the period after 1914 is to be found in the publications of the Canadian Bank of Commerce, *Annual Reports,* 1914–19, and *Year Books,* 1920–24.

Economic Aspects of Farming

The reports of the Department of the Interior give information on the methods and extent of disposition of land, and successive census reports present statistics on land utilization.

The subject of agricultural indebtedness before 1914 is carefully considered in the *Report of the Agricultural Credit Commission of the Province of Saskatchewan,* 1913. The situation since the war has been reviewed by J. B. Morman in *Farm*

Credits in the United States and Canada, New York, 1924, and has been made the subject of special reports: by Dr. H. M. Tory, *Report on Agricultural Credit* (Dominion Sessional Papers, No. 142, 1924), and a similar report in 1925; and by Dr. D. A. McGibbon, *Report of the Commission on Banking and Credit with respect to the Industry of Agriculture in the Province of Alberta* (mimeographed), 1922.

The economic position of the farmer in the period of depression from 1920 to 1924 can be studied in great detail in the reports of evidence given to the Select Special Committee of the House of Commons to Inquire into Agricultural Conditions, 1923, *Dominion House of Commons Journal 1923,* Appendix No. 3.

Costs of production of wheat in Western Canada have not been specifically discussed in this study, because they have already received detailed consideration in Wheat Studies, No. 6, *Average Pre-War and Post-War Farm Costs of Wheat Production in the North American Spring-Wheat Belt.*

Canadian Wheat in the World Markets

Up to January 1920, statistical reports on Canadian wheat stores and movements were printed in the *Weekly Bulletin* of the Department of Trade and Commerce (later the *Commercial Intelligence Journal*). At the present time, statistical information, in much fuller form, is presented weekly in *Canadian Grain Statistics,* Board of Grain Commissioners, Fort William, Ontario (since January 1921); monthly in the *Monthly Bulletin of Agricultural Statistics* (after 1917: it was published as the *Census and Statistics Monthly,* 1908–17) and the *Monthly Report on the Trade of Canada,* Dominion Bureau of Statistics, Ottawa; and annually in the reports of the Department of Trade and Commerce and the Department of Customs and Excise.

Information upon the export demand that exists for Canadian wheat by virtue of its qualities is to be found in occasional articles in the *Commercial Intelligence Journal,* weekly, Department of Trade and Commerce, Ottawa. The demand in England and Scotland is discussed in great detail in an appendix to *Report of the Royal Grain Inquiry Commission,* 1925. The periodical literature of the milling trade also gives occasional references to the demand for Canadian wheat and flour in various markets. To the list of periodicals given in Wheat Studies, January 1925, must be added the *Canadian Milling and Grain Journal,* Montreal. This paper of course contains unique information on Canadian supply and demand, but pays little attention to export markets.

NOTES CONCERNING STATISTICAL TABLES

The statistical data underlying the discussion are presented at length in the tables included on the following pages. They are computed from many scattered sources, some of them difficult of access, and present information on many points which are not fully considered in the text. The tables are arranged in an order which appears to possess advantages for study and comparison.

Statistics on the economic activities of Canada and on Canadian wheat production, have been compiled for many years. It is inevitable that, in so long a time, the methods of collecting and publishing, and the authorities responsible for these tasks, should have changed on many occasions, and that continuous consistent statistical records are seldom to be found. Furthermore, many of the statistics presented in this study and in the following tables have been published at various times, even by the same compiling authority, with different numerical values. In some cases a reason has been assigned for the change, but in others no explanation could be discovered. There are also to be found cases in which figures have required correction in order to harmonize them with earlier or later figures, and such corrections have not been made. In the face of these contradictions, the general principle adopted in the course of preparation of this study has been to select for reproduction the latest figures issued by the compiling authorities. Doubtless many errors of detail remain, even when this has been done; but it is unlikely that any serious misconception can arise as a result.

It will be observed that the statistics of wheat production are reproduced from three sources—provincial, Census, and Dominion. Some explanation of these sources is necessary.

The Manitoba Department of Agriculture issued yearly statistics of agricultural production from 1883, and the Department of Agriculture of the Northwest Territories from 1898 on. After the provinces of Saskatchewan and Alberta had been formed out of the Northwest Territories in 1905, the two newly-created departments of agriculture began to issue statistics, each for its own province. The statistics for earlier years were also recomputed, in order to produce a continuous series for each provincial area from 1898 on. Prior to 1918 the annual statistics for all the provinces were probably compiled from reports by local crop correspondents.

The character of the census reports is plain. Statistics of agricultural production were determined by enumerators, each of whom visited all farms in his district. In the earlier censuses, at least, they collected statistics of agricultural production for the growing season of the *previous* year. For this and other reasons, the accuracy of the compilation is not beyond question, although it is doubtless superior in this respect to the yearly statistics prepared by the provinces or the Dominion.

Not until 1908 did the Dominion government begin to publish annual agricultural statistics, although the Census and Statistics Office (after 1918 the Dominion Bureau of Statistics). This office collected reports from its own crop correspondents and published statistics which did not agree with either provincial or census estimates. Since 1918, however, the Dominion and provincial governments have worked more closely together, and they now publish agreed results. At the present time the crop correspondents make the returns on which the provincial estimates of acreage and the forecasts of crops are based. They also make the final estimates of yield after the crops have been harvested. The final statements of acreage are based upon returns made by individual farmers, the forms for the purpose being distributed and collected through the rural schools. In Manitoba and Saskatchewan about 30 per cent of the estimated number of farmers make these returns, in Alberta about 20 per cent.

TABLE I.—WHEAT PRODUCTION, 1920–24, OF FIVE LEADING PRODUCER-EXPORTERS*

Year	United States	Canada	Argentina	Australia	British India
	Production *(million bushels)*				
1920	833	263	156	146	378
1921	815	301	191	129	250
1922	868	400	196	109	367
1923	797	474	257	126	369
1924	873	262	191	164	364
Average	837	340	198	135	346
	Percentage of World Production (ex-Russia)				
1920	28.8	9.1	5.4	5.0	13.1
1921	26.2	9.7	6.1	4.1	8.0
1922	27.5	12.7	6.2	3.5	11.6
1923	22.8	13.6	7.4	3.6	10.6
1924	28.2	8.5	6.2	5.3	11.7
Average	26.6	10.8	6.3	4.3	11.0

* Sources: Official data, and U. S. Department of Agriculture estimates of world production.

TABLE II.—WHEAT EXPORTS (INCLUDING FLOUR) OF FIVE LEADING PRODUCER-EXPORTERS, CROP YEARS 1920–21 TO 1924–25*

Ending July 31	United States	Canada	Argentina	Australia	British India
	Net Exports *(million bushels)*				
1921	318	168	64	89	15
1922	251	187	118	115	(14) [a]
1923	200	281	139	50	29
1924	127	348	172	86	20
1925	260 [b]	184 [b]	135 [b]	115 [b]	35 [b]
Average	231	234	126	91	17
	Percentage of Net Exports to World Exports (ex-Russia)				
1921	48.6	25.7	9.8	13.6	2.3
1922	36.7	27.3	17.3	16.8	2.0
1923	28.2	39.6	19.6	7.0	4.1
1924	16.1	44.2	21.8	10.9	2.5
1925	34.7 [b]	24.6 [b]	18.0 [b]	15.4 [b]	4.7 [b]
Average	32.2	32.6	17.6	12.7	2.4
	Percentage of Net Exports to Preceding Crop				
1921	38.2	63.9	41.0	61.0	4.0
1922	30.8	62.1	61.8	89.1	(5.6) [a]
1923	23.0	70.2	70.9	45.9	7.9
1924	15.9	73.4	66.9	68.3	5.4
1925	29.8 [b]	70.2 [b]	70.7 [b]	70.1 [b]	9.6 [b]
Average	27.5	68.0	62.3	66.9	4.3

* Sources: See WHEAT STUDIES, December 1924, pp. 50, 55.
a Net imports.
b Preliminary approximation. See WHEAT STUDIES, I, 161.

TABLE III.—COMPARISON OF PRE-WAR AND POST-WAR ACREAGE, PRODUCTION, AND NET EXPORTS OF WHEAT (INCLUDING FLOUR), FOR FIVE LEADING PRODUCER-EXPORTERS*

5-year period	United States	Canada	Argentina	Australia	British India
	Acreage *(million acres)*				
1909–13	47.1	9.9	16.1	7.6	29.2
1920–24	60.2	21.7	16.0	9.8	29.1
Net change	+13.1	+11.8	−0.1	+2.2	−0.1
Per cent	+28	+119	−0.6	+29	−0.3
	Production *(million bushels)*				
1909–13	690	197	147	90	352
1920–24	837	340	198	135	346
Net change	+147	+143	+51	+45	−6
Per cent	+21	+73	+35	+50	−1.7
	Net Exports, Including Flour *(million bushels)*				
1909–14	110	96	85	55	50
1920–25	231 [a]	234 [a]	126 [a]	91 [a]	17 [a]
Net change	+121	+138	+41	+36	−33
Per cent	+110	+144	+48	+65	−66

* Sources: Official data; *International Crop Reports.*
a Including preliminary approximation for 1924–25.

TABLE IV.—POPULATION OF PRAIRIE PROVINCES AND CANADA, 1871–1921*
(Thousands)

Census year	Canada	Prairie provinces	Manitoba	Saskatchewan	Alberta
1871	3,689	43	25	18 [a]	
1881	4,325	100	62	38	
1891	4,833	219	153	67	
1901	5,371	420	255	91	73
1906	6,171 [b]	809	366	258	185
1911	7,207	1,328	461	492	374
1916	8,036 [b]	1,698	554	648	497
1921	8,788	1,956	610	758	588

* Source: Census Reports. The following additional figures were obtained by special censuses:—

Manitoba		Northwest Territories (organized districts)	
1886	109	1885	48
1896	193	1894	87

a 1906 Census Report. *b* Official estimates.

TABLE V.—POPULATION OF THE PRAIRIE PROVINCES, CLASSIFIED BY PLACE OF BIRTH, 1881–1921*
(Thousands)

Place of birth	1881	1891	1901	1906	1911	1916	1921	Place of birth
Prairie provinces [a]	56	82	158	233	384	586	834	Prairie provinces [a]
Other provinces	25	74	120	211	297	340	327	Other provinces
Canada, total	81	156	278	444	681	926	1,161	Canada, total
United States	2	5	21	91	167	198	209	United States
United Kingdom	8	40	50	122	243	282	308	United Kingdom
Other countries (chiefly European)	9	18	71	152	237	292	278	Other countries (chiefly European)
Total	100	219	420	809	1,328	1,698	1,956	Total

* Source: Census Reports. *a* This includes the native Indian population, which has been reported as 36, 26, (no report), 47, (no report), 36, 39, and 41 thousand in successive census years.

TABLE VI.—IMMIGRATION TO CANADA, 1881–1925*

(Thousands)

Year ending	Total	From United States	From United Kingdom	From other countries	Year ending	Total	From United States	From United Kingdom	From other countries
Dec. 31, 1881	48.0	21.8 [a]	17.0	9.1	June 30, 1905	146.3	43.5	65.4	37.4
1882	112.5	58.4 [a]	41.3	12.8	1906	189.1	57.8	86.8	44.5
1883	133.6	78.5 [a]	45.4	9.7	Mar. 31, 1907	124.7 [c]	34.7 [c]	55.8 [c]	34.2 [c]
1884	103.8	65.9 [a]	31.8	6.2	1908	262.5	58.3	120.2	84.0
					1909	146.9	59.8	52.9	34.2
1885	79.2	57.5 [a]	18.6	3.1					
1886	69.2	40.6 [a]	23.5	5.0	1910	208.8	103.8	59.8	45.2
1887	84.5	41.0 [a]	31.1	12.4	1911	311.1	121.5	123.0	66.6
1888	88.8	45.0 [a]	30.9	13.0	1912	354.2	133.7	138.1	82.4
1889	91.6	67.9 [a]	19.4	4.3	1913	402.4	139.0	150.5	112.9
					1914	384.9	107.5	142.6	134.7
1890	75.1	50.3 [a]	21.8	2.9					
1891	82.2	52.5 [a]	22.0	7.6	1915	144.8	59.8	43.3	41.7
1892	31.0	[a]	22.6	8.4	1916	48.5	36.9	8.7	2.9
1893	29.6	[a]	20.1	9.6	1917	75.4	61.4	8.3	5.7
1894	20.8	[a]	16.0	4.8	1918	79.1	71.3	3.2	4.6
					1919	57.7	40.7	9.9	7.1
1895	18.8	[a]	15.0	3.8					
1896	16.8	[a]	12.4	4.5	1920	117.3	49.7	59.6	8.1
1897	21.7	2.4	11.4	7.9	1921	148.5	48.1	74.3	26.2
1898	31.9	9.1	11.2	11.6	1922	90.0	29.3	39.0	21.6
1899	44.5	11.9	10.7	21.9	1923	72.9	22.0	34.5	16.4
					1924	148.6	20.5	72.9	55.1
June 30, 1900	23.9 [b]	8.5 [b]	5.1 [b]	10.2 [b]					
1901	49.1	18.0	11.8	19.4	1925	111.4	15.8	53.2	42.4
1902	67.4	26.4	17.3	23.7					
1903	128.4	49.5	41.8	37.1					
1904	130.3	45.2	50.4	34.8					

* Sources: 1881–1923, *Report of the Department of Immigration and Colonization*, 1923; 1924–25, *Monetary Times*, Toronto, May 8, 1925, p. 12.

a The earlier figures for immigrants from the United States are not comparable with the other statistics, since they include large numbers of seasonal migratory laborers. No statistics were collected for 1892–96.

b Six months. *c* Nine months.

TABLE VII.—DISPOSITION OF THE SURVEYED AREAS OF MANITOBA, SASKATCHEWAN, AND ALBERTA, JANUARY 1, 1921*

(Thousand acres)

Disposition	Total	Manitoba	Saskatchewan	Alberta
Hudson's Bay Co.	6,556	1,197	3,183	2,176
Railway grants	31,864	3,567	15,177	13,120
School lands	9,324	1,631	3,942	3,752
Special grants	16,835	5,095	7,835	3,905
Under homestead	54,114	8,367	25,479	18,268
Sales under irrigation system	1,058	—	77	981
Total allotted to private ownership [a]	119,751	19,857	57,693	42,202
Available for entry	25,650	5,276	4,913	15,461
Forest reserves, etc.	28,948	3,133	7,384	18,432
Other purposes [b]	25,931	7,306	9,036	9,587
Total unallotted	80,529	15,715	21,333	43,480
Total surveyed areas	200,280	35,572	79,026	85,682

* Source: *Report of the Department of the Interior*, 1921.

a The reported figure for total area alienated from the crown is 123,628,182 acres. The figures given above for total allotments are obtained by addition of listed items and are probably not inclusive of certain small allotments which cannot be separated from items of unallotted areas on the basis of available data.

b Road allowances, Indian reserves, timber leases, grazing leases, water-covered lands, etc.

TABLE VIII. — HOMESTEAD ENTRIES IN PRAIRIE PROVINCES, 1872–1924*

Year ending	Entries	Cancellations
Dec. 31, 1872	283	[a]
1873	878	[a]
Oct. 31, 1874	1,376	[a]
1875	499	[a]
1876	347	[a]
1877	845	[a]
1878	1,788	[a]
1879	4,068	[a]
1880	2,074	[a]
1881	2,753	[a]
1882	7,483	[a]
1883	6,063	1,104
1884	3,753	1,334
1885	1,858	1,296
1886	2,657	1,033
1887	2,036	633
1888	2,655	935
1889	4,416	1,337
1890	2,955	1,167
1891	3,523	1,002
1892	4,840	1,093
1893	4,067	1,277
1894	3,209	1,558
Dec. 31, 1895	2,394	1,222[b]
1896	1,857	1,165
1897	2,384	1,090[c]
1898	4,848	1,546
1899	6,689	1,746
June 30, 1900	4,132[d]	1,096[d]
1901	8,167	1,682
1902	14,673	3,296
1903	31,383	5,208
1904	26,073	8,702
1905	30,819	11,296
1906	41,869	11,637
Mar. 31, 1907	21,647[e]	14,110[e]
1908	30,424	15,668
1909	39,081	14,677
1910	41,568	16,832
1911	44,479	22,122
1912	39,151	18,608
1913	33,699	17,280
1914	31,829	15,997
1915	24,088	12,514
1916	17,030	12,731
1917	11,199	9,570
1918	8,319	6,314
1919	4,227	4,115
1920	6,732	7,891
1921	5,389	7,336
1922	7,349	7,806
1923	5,343	7,061
1924	3,657[f]	[g]

* Source: *Annual Reports of the Department of the Interior.*

[a] Until 1882–83 data for annual cancellations are not available.

[b] Ten months ending Oct. 31, 1895.

[c] Year ending June 30.

[d] Six months only.

[e] Nine months only.

[f] Preliminary figure.

[g] Data not available.

TABLE IX.—SALES OF GRANTED LANDS IN PRAIRIE PROVINCES, 1893–1924*

Year ending	Area (thousand acres)	Average price per acre ($)
Dec. 31, 1893	120	2.93
1894	69	3.02
1895	115	1.94
1896	108	3.34
1897	222	3.23
1898	449	3.18
1899	462	3.28
June 30, 1900	648	3.27
1901	621	3.36
1902	2,202	3.56
1903	4,229	3.46
1904	1,267	4.39
1905	990	5.09
1906	1,643	6.01
1907	1,278[a]	6.02[a]
Mar. 31, 1908	347	8.80
1909	109	11.08
1910	1,185	13.36
1911	1,407	13.59
1912	1,329	13.70
1913	707	13.95
1914	502	14.75
1915	193	17.01
1916	355	15.32
1917	755	16.35
1918	1,116	18.71
1919	1,039	17.47
1920	1,026	18.70
1921	554	19.62
1922	155	16.96
1923	123	15.12
1924	160	15.40

* Sources: *Annual Reports of the Department of the Interior; Canada Year Book,* 1924.

[a] Nine months, July 1, 1906–March 31, 1907.

TABLE X.—LAND OWNERSHIP AND FARM AREA IN WESTERN CANADA, 1921*

(Thousand acres)

	Total	Manitoba	Saskatchewan	Alberta
In private ownership [a]	119,751	19,856	57,693	42,202
Not in farms	31,819	5,240	13,670	12,909
Occupied farms	87,932	14,616	44,023	29,293
Improved farm land	44,863	8,058	25,037	11,768
Unimproved farm land	43,069	6,558	18,986	17,525

* Sources: Appendix Table VII; *Census of Agriculture*, 1921, Bulletin No. 11.
[a] See footnote to Table VII.

TABLE XI.—FARMS OF OVER 100 ACRES IN WESTERN CANADA, CENSUS YEARS 1880–1921*

(Number of "Occupiers")

Census year	Total	Manitoba	Saskatchewan	Alberta
1880	8,754	7,914	840	
1884	—	—	6,836	
1885	—	16,142	—	
1891	28,131	19,535	6,352	2,244
1901	51,987	29,598	13,225	9,164
1906	116,000 [b]	33,000 [b]	55,000 [b]	28,000 [b]
1911	190,403	38,188	93,758	58,457
1916	209,953	41,067	102,887	65,999
1921	245,616	47,550	117,629	80,437

* Source: Census Reports, in particular, Vol. IV, 1911, Table 4.
[a] Over 80 acres.
[b] Approximate figure roughly computed.

TABLE XII.—AREAS OF OCCUPIED AND IMPROVED LANDS IN WESTERN CANADA, CENSUS YEARS, 1880–1921*

(Thousand acres)

Census year	Occupied				Census year	Improved [a]			
	Total	Manitoba	Saskatchewan	Alberta		Total	Manitoba	Saskatchewan	Alberta
1880	2,698	2,384	314		1880	279	250	29	
1884	—	—	3,861		1884	—	—	196	
1885	—	4,171	—		1885	—	753	—	
1890	8,138	5,228	2,910		1890	1,429	1,232	197	
1901	15,412	8,843	3,833	2,736	1901	5,593	3,995	1,123	475
1911	57,642	12,184	28,099	17,359	1911	22,970	6,746	11,872	4,352
1916	73,300	13,437	36,801	23,063	1916	34,330	7,188	19,632	7,510
1921	87,932	14,616	44,023	29,293	1921	44,863	8,058	25,037	11,768

* Source: Census Reports.
[a] The definition of "improved land" was made more exacting in 1911.

TABLE XIII.—WHEAT ACREAGE, PRODUCTION, AND YIELD PER ACRE IN MANITOBA, 1883–97*

Crop year	Acreage *(thousand acres)*	Production *(million bushels)*	Yield per acre *(bushels)*	Crop year	Acreage *(thousand acres)*	Production *(million bushels)*	Yield per acre *(bushels)*
1883	261	5.7	21.8	1891	917	23.2	25.3
1884	307	6.2	20.1	1892	876	14.5	16.5
1885	357	7.4	20.8	1893	1,004	15.6	15.6
1886	384	5.9	15.3	1894	1,010	17.2	17.0
1887	432	12.4	28.6	1895	1,140	31.8	27.9
1888	[a]	[a]	[a]	1896	1,000	14.4	14.4
1889	632	7.2	11.4	1897	1,291	18.3	14.1
1890	746	14.7	19.6				

* Sources: *Annual Report of the Department of Agriculture and Immigration of the Province of Manitoba.* No satisfactory annual data are available for the Northwest Territories until 1898.
[a] There was a partial crop failure in 1888 due to a frost in the middle of August, and no official statistics were compiled. The Winnipeg Board of Trade estimated a 20 per cent loss in Manitoba, so that, when allowance is made for the increase of acreage from 1887 to 1888, the crop of 1888 was probably of about the same size as the crop of 1887. (*Report of the Department of the Interior*, 1888.)
The Winnipeg Immigration Agent reported for 1876 a crop of 480 thousand bushels and a yield of 32 bushels, and for 1881 a crop of 2 million bushels and a yield of 23 bushels. (Reports of the Department of Agriculture.)

TABLE XIV.—PROVINCIAL ESTIMATES OF WHEAT ACREAGE, PRODUCTION, AND YIELD PER ACRE IN THE PRAIRIE PROVINCES, 1898–1924*

Year	Acreage *(thousand acres)*				Production *(million bushels)*				Yield per acre *(bushels)*			
	Total	Manitoba	Saskatchewan	Alberta	Total	Manitoba	Saskatchewan	Alberta	Total	Manitoba	Saskatchewan	Alberta
1898	1,795	1,488	276	31	30.9	25.3	4.8	.8	17.2	17.0	17.3	25.3
1899	1,993	1,630	328	35	34.8	28.0	6.1	.8	17.5	17.1	18.5	23.7
1900	1,869	1,457	382	30	17.1	13.0	3.4	.6	9.1	8.9	9.0	19.2
1901	2,517	2,012	470	35	63.3	50.5	12.0	.9	25.2	25.1	25.4	24.6
1902	2,666	2,040	581	45	67.0	53.1	13.1	.9	25.1	26.0	22.6	18.9
1903	3,284	2,443	778	63	56.4	40.1	15.1	1.2	17.2	16.4	19.4	19.0
1904	3,377	2,412	910	55	56.0	39.2	16.0	.9	16.6	16.2	17.5	17.1
1905	3,881	2,644	1,130	107	84.2	55.8	26.1	2.3	21.7	21.1	23.1	21.6
1906	5,051	3,142	1,731	178	102.3	61.3	37.0	4.0	20.2	19.5	21.4	22.3
1907	5,046	2,790	2,048	208	71.6	39.7	27.7	4.2	14.2	14.2	13.5	20.2
1908	6,873	2,851	3,704	318	107.0	49.3	50.7	7.1	15.6	17.3	13.7	22.3
1909	7,153	2,642	4,085	426	144.5	45.8	90.2	8.5	20.2	17.3	22.1	19.9
1910	8,219	2,962	4,665	592	120.5	39.9	72.7	7.9	14.7	13.5	15.6	13.4
1911	9,535	3,339	5,256	940	178.4	61.1	97.2	20.1	18.7	18.3	18.5	21.3
1912	9,286	2,823	5,384	1,079	185.4	58.4	107.2	19.8	20.0	20.7	19.9	18.4
1913	10,028	3,141	5,760	1,127	196.7	62.8	112.4	21.6	19.6	20.0	19.5	19.2
1914	10,410	3,366	6,004	1,040	143.0	52.5	74.6	15.9	13.7	15.5	12.4	15.3
1915	13,857	3,664	8,524	1,669	371.5	96.7	214.8	60.1	26.8	26.4	25.2	35.9
1916	13,096	2,995	8,533	1,568	193.9	30.4	121.9	41.6	14.8	10.2	14.2	26.5
1917	13,801	2,853	8,273	2,675	213.4	42.7	117.9	52.8	15.5	14.9	14.2	19.7
1918	15,228	2,917	9,249	3,062	164.4	48.1	92.5	23.8	10.8	16.5	10.0	7.8
1919	16,315	2,862	10,587	2,866	165.5	41.0	90.0	34.6	10.1	14.3	8.5	12.1
1920	16,822	2,688	10,061	4,073	234.1	37.5	113.1	83.4	13.9	14.0	11.2	20.5
1921	21,591	3,385	13,557	4,649	293.4	39.1	201.3	53.0	13.6	11.5	14.8	11.4
1922	21,189	3,091	12,332	5,766	376.0	60.1	250.2	65.7	17.7	19.4	20.2	11.4
1923	21,587	2,822	12,791	5,974	455.7	32.8	252.6	167.3	21.1	11.6	19.7	28.0
1924	21,065	2,459	13,033	5,573	235.7	41.5	132.9	61.3	11.2	16.9	10.2	11.0

* Sources: Annual Reports and Crop Bulletins of the Department of Agriculture of each province. The wheat crop of the Northwest Territories in 1894 was about 2.5 million bushels. In 1896 the wheat area was 242 thousand acres and the crop 4.8 million bushels. (Reports of Lieutenant-Governor of the Northwest Territories.)

TABLE XV.—PROVINCIAL ESTIMATES FOR LAND CULTIVATION IN THE PRAIRIE PROVINCES, 1908–1924*

(Thousand acres)

Year	New breaking				Summer fallowing				Fall plowing		Spring plowing [a]
	Prairie provinces	Manitoba	Saskatchewan	Alberta	Prairie provinces	Manitoba	Saskatchewan	Alberta	Manitoba	Saskatchewan	Saskatchewan
1908	[b]	[b]	1,721	[b]	[b]	[b]	1,191	[b]	[b]	[b]	[b]
1909	[b]	155	1,758	[b]	[b]	684	1,773	[b]	1,333	[b]	[b]
1910	[b]	307	2,443	[b]	[b]	1,023	1,824	[b]	2,197	[b]	[b]
1911	[b]	233	2,303	[b]	[b]	964	2,188	[b]	978	[b]	[b]
1912	[b]	233	2,298	[b]	[b]	1,017	2,418	[b]	696	[b]	[b]
1913	[b]	156	1,149	[b]	[b]	1,144	2,775	[b]	1,582	1,734	4,253
1914	[b]	175	1,076	[b]	[b]	1,208	2,601	[b]	2,734	4,407	2,459
1915	[b]	193	946	[b]	[b]	1,094	2,668	[b]	1,509	2,254	7,086
1916	[b]	90	659	[b]	[b]	1,235	2,536	[b]	1,847	1,296	9,727
1917	[b]	106	432	[b]	6,293	1,381	3,759	1,153	1,900	1,944	6,135
1918	[b]	182	615	[b]	7,204	1,475	4,061	1,668	1,834	1,164	10,494
1919	1,629	196	850	583	7,464	1,351	4,396	1,718	1,833	499	11,604
1920	1,224	188	550	486	6,995	1,410	3,752	1,834	2,730	420	17,154
1921	1,291	158	616	517	9,797	1,612	5,908	2,276	3,133	636	19,082
1922	1,057	129	433	494	9,461	1,597	5,403	2,460	2,996	668	[b]
1923	1,010	97	425	487	9,624	1,518	5,346	2,760	2,815	529	[b]
1924	877	71	407	399	9,068	1,446	5,309	2,313	1,126	2,838	[b]

* Sources: Annual Reports and Crop Bulletins of the Department of Agriculture of each province.
[a] Following spring. [b] Data not available.

TABLE XVI. — CENSUS ESTIMATES OF WHEAT ACREAGE, PRODUCTION, AND YIELD PER ACRE IN THE PRAIRIE PROVINCES, 1880–1921

Year	Acreage *(thousand acres)*				Production *(million bushels)*				Yield per acre *(bushels)*			
	Total	Manitoba	Saskatchewan	Alberta	Total	Manitoba	Saskatchewan	Alberta	Total	Manitoba	Saskatchewan	Alberta
1880	57	51	6		1.1	1.0	.1		20.2	20.1	21.1	
1890	1,010	897	107	6	17.9	16.1	1.7	.09	17.7	17.9	15.8	15.2
1900	2,495	1,965	487	43	23.5	18.4	4.3	.80	9.4	9.3	8.8	18.6
1905	3,941	2,417	1,376	148	82.5	47.6	31.8	3.04	20.9	19.7	23.1	20.5
1906	5,062	2,721	2,117	224	110.6	54.5	50.2	5.93	21.8	20.0	23.7	26.5
1910	7,867	2,759	4,228	880	110.2	34.1	67.0	9.06	14.0	12.4	15.8	10.3
1911	9,991	3,095	5,256	1,640	208.4	62.7	109.1	36.60	20.9	20.3	20.8	22.3
1915	13,867	2,800	8,929	2,138	360.2	69.3	224.3	66.54	26.0	24.8	25.1	31.1
1916	14,363	2,726	9,032	2,605	242.3	29.7	147.6	65.09	16.9	10.9	16.3	25.0
1920	16,775	2,507	10,189	4,079	207.2	33.4	115.5	58.20	12.3	13.3	11.3	14.3
1921	19,389	2,819	11,684	4,886	—	—	—	—	—	—	—	—

TABLE XVII.—DOMINION ESTIMATES OF WHEAT ACREAGE, PRODUCTION, AND YIELD PER ACRE IN THE PRAIRIE PROVINCES, 1908–24*

Year	Acreage *(thousand acres)*				Production *(million bushels)*				Yield per acre *(bushels)*			
	Total	Manitoba	Saskatchewan	Alberta	Total	Manitoba	Saskatchewan	Alberta	Total	Manitoba	Saskatchewan	Alberta
1908	5,624	2,957	2,396	271	91.9	50.3	34.7	6.8	16.3	17.0	14.5	25.2
1909	6,878	2,808	3,685	385	147.5	52.7	85.2	9.6	21.4	18.8	23.1	24.9
1910	7,868	2,760	4,228	880	110.2	34.1	67.0	9.1	14.0	12.4	15.8	10.3
1911	9,991	3,095	5,256	1,640	208.4	62.7	109.1	36.6	20.9	20.3	20.8	22.3
1912	10,011	2,839	5,582	1,590	204.3	63.0	107.0	34.3	20.4	22.2	19.2	21.6
1913	10,036	2,804	5,720	1,512	209.4	53.3	121.7	34.4	20.8	19.0	21.2	22.8
1914	9,335	2,616	5,348	1,371	141.0	38.6	73.6	28.9	15.1	14.8	13.7	21.1
1915	13,867	2,800	8,929	2,138	360.2	69.3	224.3	66.5	26.0	24.8	25.1	31.1
1916	14,363	2,726	9,032	2,605	242.3	29.7	147.6	65.1	16.9	10.9	16.3	25.0
1917	13,620	2,449	8,273	2,898	212.0	41.0	117.9	53.0	15.6	16.8	14.2	18.3
1918	16,125	2,984	9,249	3,892	164.4	48.2	92.5	23.8	10.2	16.4	10.0	6.1
1919	17,750	2,880	10,587	4,283	165.5	41.0	90.0	34.6	9.3	14.2	8.5	8.1
1920	16,841	2,706	10,061	4,074	234.1	37.5	113.1	83.5	13.9	13.9	11.2	20.5
1921	22,181	3,501	13,557	5,123	280.1	39.1	188.0	53.0	12.6	11.2	13.8	10.4
1922	21,224	3,126	12,332	5,766	375.2	60.1	250.2	65.0	17.7	19.2	20.2	11.3
1923	20,879	2,916	12,791	5,172	452.3	35.8	271.6	144.8	20.8	12.3	21.3	28.1
1924	21,065	2,459	13,033	5,573	235.7	41.5	132.9	61.3	11.2	16.9	10.2	11.0

TABLE XVIII.—DOMINION ESTIMATES OF FARM PRICES AND FARM VALUES OF CANADIAN WHEAT, 1908–24*

Crop of	Average estimated farm price *(dollars per bushel)*					Crop of	Estimated farm value *(million dollars)*				
	Manitoba	Saskatchewan	Alberta	Prairie provinces	Total Canada		Manitoba	Saskatchewan	Alberta	Prairie provinces	Total Canada
1908	.83	.74	.68	.79	.81	1908	41.9	25.9	4.6	72.4	91.2
1909	.87	.81	.73	.82	.85	1909	45.9	68.7	7.0	121.6	141.3
1910	.80	.69	.69	.72	.75	1910	27.3	46.2	6.3	79.8	99.5
1911	.67	.58	.62	.61	.64	1911	42.0	63.3	22.5	127.8	148.1
1912	.67	.56	.54	.59	.62	1912	42.2	59.9	18.5	120.6	139.1
1913	.71	.64	.61	.65	.67	1913	37.9	77.8	21.0	136.7	156.5
1914	1.01	.95 [a]	.91	.96 [a]	.98 [a]	1914	39.0	69.8 [a]	26.4	135.2 [a]	157.5 [a]
1915	.90	.91	.88	.90	.91	1915	62.7	203.9	58.3	324.9	356.8
1916	1.23	1.28	1.33	1.29	1.31	1916	36.5	188.9	86.6	312.0	344.1
1917	2.05	1.95	1.74	1.92	1.94	1917	84.1	230.0	91.9	406.1	453.0
1918	2.06	1.99	1.92	2.00	2.02	1918	99.3	184.1	45.6	328.9	381.7
1919	2.40	2.32	2.31	2.34	2.37	1919	98.3	208.8	79.9	387.1	457.7
1920	1.83	1.55	1.52	1.58	1.62	1920	68.8	175.4	126.9	371.0	427.4
1921	.91	.76	.77	.78	.81	1921	35.5	142.9	40.8	219.2	242.9
1922	.83	.85	.77	.83	.85	1922	49.8	212.6	50.0	312.5	339.4
1923	.67	.65	.65	.65	.67	1923	24.0	176.6	94.1	294.7	317.0
1924	1.24	1.21	1.20	1.21	1.22	1924	51.4	160.8	73.6	285.8	320.4

* Sources: *Census and Statistics Monthly*, 1908–17; *Monthly Bulletin of Agricultural Statistics*, 1917–.

a The reported 1914 figures for Saskatchewan were $1.48 a bushel and 108.7 million dollars. These are evidently errors, in view of the fact that *spot* prices of No. 1 Manitoba wheat during the months September to December 1914, never exceeded $1.18. The price figure has been adjusted on the basis of farm prices in Alberta and Manitoba for that year, and the value figure altered in accordance.

TABLE XIX.—RAILWAY MILEAGE IN THE PRAIRIE PROVINCES, 1895–1923*

As of June 30	Total	Manitoba	Saskatchewan	Alberta	As of June 30	Total	Manitoba	Saskatchewan	Alberta
1895	3,244	1,472	1,772		1910	7,641	3,221	2,932	1,488
1896	3,254	1,474	1,780		1911	8,081	3,466	3,121	1,494
1897	3,355	1,575	1,780		1912	9,171	3,520	3,754	1,897
1898	3,399	1,621	1,778		1913	10,856	3,993	4,651	2,212
1899	3,533	1,603	1,930		1914	11,710	4,076	5,089	2,545
1900	[a]	[a]	[a]		1915	12,999	4,498	5,327	3,174
1901	4,141	2,056	1,107	978	1916	13,581	4,309	5,378	3,894
1902	4,208	2,128	1,102	978	1917	14,762	4,194	6,124	4,444
1903	4,319	2,224	1,117	978	1918	14,603	4,168	6,162	4,273
1904	4,564	2,364	1,180	1,020	1919 [b]	14,688	4,193	6,141	4,354
1905	5,215	2,672	1,523	1,020	1920 [b]	15,097	4,403	6,220	4,474
1906	5,996	2,823	1,973	1,200	1921 [b]	15,270	4,417	6,296	4,557
1907	6,422	3,074	2,025	1,323	1922 [b]	15,532	4,585	6,267	4,680
1908	6,515	3,111	2,081	1,323	1923 [b]	15,822	4,521	6,517	4,784
1909	7,157	3,205	2,631	1,321					

* Sources: Annual Reports of the Department of the Interior and of the Department of Railways and Canals; *Canada Year Books*.

[a] Data not available.

[b] As of December 31.

TABLE XX.—CAPACITY OF LICENSED ELEVATORS AND WAREHOUSES AT COUNTRY POINTS IN THE PRAIRIE PROVINCES, AND OF ONTARIO TERMINAL ELEVATORS,[a] 1901–25*

(Thousand bushels)

Year ending August 31	Country elevators and warehouses in prairie provinces				Ontario terminal elevators [a]		Year ending August 31
	Total	Manitoba	Saskatchewan	Alberta	Public	Private [a]	
1901	12,759	10,323	2,436		5,570	—	1901
1902	15,449	12,255	3,194		7,100	—	1902
1903	21,226	16,121	5,105		8,580	—	1903
1904	27,214	19,297	7,917		13,422	—	1904
1905	28,492	19,558	8,934		17,912	—	1905
1906	31,324	20,656	8,952	1,716	18,580	—	1906
1907	36,278	20,502	12,990	2,786	18,075	—	1907
1908	39,501	21,016	14,666	3,819	17,059	—	1908
1909	42,898	20,588	17,924	4,386	18,583	—	1909
1910	53,978	21,624	24,314	8,040	21,741	—	1910
1911	57,043	21,814	26,465	8,764	25,700	—	1911
1912	61,587	22,410	29,314	9,863	25,700	—	1912
1913	70,322	22,253	36,503	11,566	28,885	495	1913
1914	79,478	21,690	42,995	14,793	40,050	1,405	1914
1915	86,209	22,046	48,074	16,089	40,600	1,580	1915
1916	93,863	22,113	52,943	18,807	41,350	1,735	1916
1917	102,981	21,250	58,625	23,106	41,750	3,575	1917
1918	115,053	21,826	64,394	28,833	46,375	2,995	1918
1919	122,406	22,926	67,332	32,148	46,100	5,305	1919
1920	124,544	23,024	68,058	33,462	49,500	2,755	1920
1921	126,657	22,074	68,867	35,716	46,100	8,585	1921
1922	128,432	22,159	70,181	36,092	37,850	15,435	1922
1923	131,366	21,970	72,542	36,854	42,600	14,210	1923
1924	133,815	21,354	76,199	36,262	39,775	25,335	1924
1925	138,203	20,341	81,022	36,840	41,525	24,465	1925

* Source: *List of Licensed Elevators and Warehouses in the Western Grain Inspection Division*, 1924–25. In 1884, the capacity of country elevators in Manitoba was 680 thousand, in the Northwest Territories 110 thousand bushels (Report of Emerson Immigration Agent, 1884). In 1892, the capacity of elevators at country points in Western Canada was 5,262 thousand bushels, and of warehouses at country points 754 thousand (Report of Dominion Lands Commissioner).

[a] Mainly at Fort William and Port Arthur, but including certain private elevators, of a present capacity of 1,800,000 bushels, at Kenora and Keewatin, on the Lake of the Woods.

TABLE XXI.—DATES OF SEEDING AND CUTTING WHEAT IN SASKATCHEWAN, 1905–23*

Year	Seeding		Cutting	
	Commenced	General	Commenced	Completed
1905	April 3	April 10	[a]	[a]
1906	April 4	April 9	[a]	[a]
1907	May 6	May 10	[a]	[a]
1908	April 10	April 18	[a]	[a]
1909	April 4	April 9	[a]	[a]
1910	April 1	April 10	[a]	[a]
1911	April 10	April 17	[a]	August 28 [b]
1912	April 4	April 10	August 23	August 28 [b]
1913	April 4	April 19	August 8	August 25 [b]
1914	April 6	May 1	August 10	August 11 [b]
1915	April 4	April 10	August 19	September 7
1916	April 15	April 21	August 15	September 11
1917	April 27	May 5	August 18	September 7
1918	April 7	April 15	August 15	September 7
1919	April 17	April 24	July 28	August 18
1920	May 1	May 6	August 25	September 10
1921	April 24	April 30	August 12	August 30
1922	April 26	May 2	August 15	September 1
1923	April 23	April 29	August 17	September 3

* Sources: *Reports of Saskatchewan Department of Agriculture.*

[a] Not available.

[b] Cutting general.

TABLE XXII.—IMPORTANCE OF WHEAT AND FLOUR IN CANADIAN EXPORTS, 1920–25*

(Million dollars)

Year ending March 31	Wheat	Flour	Wheat and flour	Total exports	Percent. of total
1921	311	67	378	1,189	31.8
1922	180	53	233	740	31.5
1923	252	60	312	931	33.5
1924	268	63	331	1,045	31.7
1925	252	71	323	1,069	30.2
Total	1,263	314	1,577	4,974	31.7

* Sources: Department of Trade and Commerce, *Reports on the Trade of Canada,* monthly and yearly.

TABLE XXIII.—CANADIAN EXPORTS OF WHEAT AND FLOUR, 1890–1924*

(Millions)

Year ending		Total wheat and flour *(bus.)*	Wheat *(bus.)*	Flour as wheat *(bus.)*	Flour *(bbls.)*
June 30,	1891	3.4	2.1	1.3	.30
	1892	10.4	8.7	1.7	.38
	1893	11.1	9.3	1.8	.41
	1894	11.2	9.3	1.9	.43
	1895	9.8	8.8	1.0	.22
	1896	10.8	9.9	0.8	.19
	1897	9.8	7.9	1.9	.42
	1898	24.6	19.0	5.6	1.25
	1899	13.9	10.3	3.6	.79
	1900	20.3	16.8	3.5	.77
	1901	14.8	9.7	5.0	1.12
	1902	31.0	26.1	4.9	1.09
July 31,	1903	39.9	33.8	6.1	1.36
	1904	23.2	16.3	6.9	1.54
	1905	19.4	13.7	5.7	1.27
	1906	48.1	40.8	7.3	1.62
	1907	46.5	39.4	7.0	1.56
	1908	47.6	40.1	7.5	1.67
	1909	56.7	47.7	9.0	2.01
	1910	67.8	52.6	15.2	3.37
	1911	62.4	48.4	14.0	3.10
	1912	97.9	78.8	19.1	4.25
	1913	115.7	95.5	20.2	4.50
	1914	135.6	114.9	20.7	4.60
	1915	86.7	63.9	22.8	5.08
	1916	269.2	235.7	33.4	7.43
	1917	174.6	140.2	34.3	7.63
	1918	169.2	118.6	50.7	11.26
	1919	104.1	63.0	41.0	9.12
	1920	92.5	63.4	29.0	6.46
	1921	167.2	137.0	30.2	6.72
	1922	185.8	151.0	34.7	7.72
	1923	279.4	229.9	49.5	11.00
	1924	346.5	292.4	54.1	12.02

* Sources: Canadian official statistics, *International Crop Reports,* and *International Yearbooks of Agricultural Statistics.* See note to Table XXIV.

NOTE.—This table has been specially compiled in order to show, as nearly as possible, the exportation of Canadian wheat from successive crops.

TABLE XXIV.—CANADIAN EXPORTS OF WHEAT AND FLOUR BY COUNTRIES OF DESTINATION, FISCAL YEARS, 1905–25*

Year ending	Wheat and flour as wheat *(million bushels)*							Flour *(thousand barrels)*						
	Total	Great Britain	Other Northern Europe	Southern Europe	United States	Japan, China, Hongkong	Other countries	Total	Great Britain	Other Northern Europe	Southern Europe	United States	Japan, China, Hongkong	Other countries
June 30,														
1905	17.9	13.9	.57	—	.44	.08	2.90	1,322	593	39	—	31	17	642
1906	47.3	40.3	.66	.02	3.95	.09	2.30	1,532	944	53	5	26	20	484
Mar. 31,														
1907	30.4	27.3	.46	.04	.82	.26	1.53	1,093	634	67	8	4	52	328
1908	52.5	48.1	.66	.03	.24	.69	2.78	1,964	1,131	50	6	29	153	595
1909	57.0	50.5	2.50	.27	.91	.17	2.59	1,738	1,029	66	—	58	37	548
1910	63.5	55.0	2.00	—	2.42	.18	3.89	3,064	1,877	198	—	126	39	824
1911	59.5	52.1	2.16	—	.36	.09	4.80	3,049	1,885	195	—	26	19	924
1912	81.3	70.9	4.32	.02	1.26	.31	4.51	3,739	2,339	291	5	58	68	978
1913	113.3	90.7	6.89	.07	9.97	.59	5.12	4,478	2,880	362	15	30	79	1,112
1914	142.2	121.2	5.50	.17	7.61	1.45	6.20	4,833	2,795	444	30	19	208	1,337
1915	94.2	78.4	4.66	.47	4.33	.32	6.00	4,951	3,137	457	28	52	70	1,207
1916	186.5	157.9	8.77	5.11	9.50	.14	5.08	6,399	3,895	1,127	31	251	31	1,064
1917	223.1	170.2	20.82	8.29	19.03	.04	4.69	7,426	4,031	1,886	291	185	9	1,024
1918	195.1	153.1	11.64	.41	25.87	—	4.06	9,932	6,604	1,863	43	519	—	903
1919	83.2	61.0	14.10	1.65	2.03	—	4.49	9,205	5,254	2,859	93	9	—	990
1920	117.9	77.6	13.67	13.77	6.80	—	5.98	8,863	5,825	866	812	30	1	1,329
1921	156.3	41.7	30.32	28.60	47.67	.09	7.95	6,017	2,747	221	179	1,188	20	1,662
1922	169.9	113.8	12.42	14.81	19.16	2.93	6.72	7,415	4,737	525	33	571	112	1,437
1923	261.1	188.1	24.76	13.88	18.97	5.61	9.77	10,228	4,724	1,992	303	613	496	2,100
1924	309.6	192.3	46.70	20.60	22.23	16.72	11.08	11,716	4,234	3,745	393	222	989	2,133
1925	241.4	157.7	44.82	14.17	5.68	9.34	9.68	11,029	3,275	4,952	380	57	514	1,851
5-year average														
1905–09	41.0	36.0	.97	.07	1.27	.26	2.42	1,530	866	55	4	30	56	519
1910–14	92.0	78.0	4.19	.05	4.32	.52	4.90	3,833	2,355	298	10	52	83	1,035
1915–19	156.4	124.1	12.00	3.19	12.15	.10	4.86	7,583	4,584	1,638	97	203	22	1,038
1920–24	202.9	122.7	25.58	18.33	22.97	5.07	8.30	8,848	4,453	1,470	344	525	324	1,732

* Sources: *Reports of the Department of Trade and Commerce*, and *Reports on the Grain Trade of Canada*. In Tables XXIII and XXIV, wheat and flour have been equated according to the general rule that one barrel of flour (196 pounds) is extracted from 4½ bushels of wheat (270 pounds)—an average extraction of 72.6 per cent. Canadian trade statistics of production show that this extraction is realized in practice from year to year to within 1 or 2 per cent.

It is probable that the same ratio applies fairly well to the whole volume of flour exports, as shown in Table XXIII and the totals columns of Table XXIV; but it is more doubtful whether it can be employed with the same degree of accuracy, to the wheat and flour imports of separate countries. For example, the United States market will certainly purchase a higher grade of flour (of lower extraction) than the Oriental market in general can afford to buy.

TABLE XXV.—CANADIAN EXPORTS OF WHEAT AND FLOUR, SEPTEMBER 1 TO AUGUST 31, 1921–24*

(Million bushels)

Wheat and flour	1920–21	1921–22	1922–23	1923–24
To United States	54.9	19.0	14.9	22.1
To other countries				
(1) by U. S. ports	63.6	113.7	148.9	165.3
(2) by Canadian ports	48.7	61.3	115.7	155.7
Total	167.2	194.0	279.5	343.1
Wheat, by ports				
Vancouver	—	7.8	17.8	53.8
Quebec	0.04	0.6	2.7	2.3
Montreal	25.8	27.6	54.4	61.3
St. John	6.5	6.6	12.0	9.4
Portland	13.5	9.2	18.4	7.7
Boston	0.8	5.1	7.9	7.2
New York	24.2	39.7	47.8	63.1
Philadelphia	6.1	28.1	26.1	23.2
Baltimore	5.5	7.7	15.6	15.0
Norfolk	—	—	—	12.6

* Source: *Reports on the Grain Trade of Canada*, 1921–24.

TABLE XXVI.—WHEAT GROUND IN CANADA, 1920–21 TO 1924–25*

(Million bushels)

Month	1920–21	1921–22	1922–23	1923–24	4-yr. ave. 1920–24	1924–25
Aug.	1.3	3.1	5.4	4.9	3.7	6.3
Sept.	2.7	5.7	7.3	6.6	5.6	7.7
Oct.	5.2	7.2	9.8	10.3	8.1	9.6
Nov.	4.6	7.6	10.1	10.4	8.2	7.6
Dec.	4.0	6.7	8.8	8.2	6.9	6.5
Jan.	4.8	5.7	7.4	8.5	6.6	7.7
Feb.	3.5	6.0	6.5	8.0	6.0	7.0
Mar.	4.3	6.5	7.6	7.7	6.5	7.6
Apr.	2.7	4.1	6.2	6.5	4.9	5.6
May	3.5	5.3	6.0	8.2	5.8	4.6
June	3.7	4.5	5.5	6.2	5.0	[a]
July	3.4	4.4	5.3	6.0	4.8	[a]
Total	43.7	66.8	85.9	91.5	72.0	[a]

* 1921–24—*Reports on the Grain Trade of Canada*, 1921–24; 1924–25—preliminary figures, *Canadian Grain Statistics*, July 3, 1925.

[a] Not available.

TABLE XXVII.—SEASONAL MOVEMENT OF CANADIAN WHEAT*

(Average 1920–21 to 1923–24)

Month	Cars loaded in Western Canada		Receipts at Fort William and Port Arthur		Lake shipments from Ft. William and Port Arthur		Exports of wheat grain		Exports of wheat flour	
	Number	Per cent	Quantity *(mil. bus.)*	Per cent	Quantity *(mil. bus.)*	Per cent	Quantity *(mil. bus.)*	Per cent	Quantity *(000 bbls.)*	Per cent
Aug.	4,000	1.9	3.45	1.6	6.19	3.1	7.94	3.9	498	5.3
Sept.	36,322	17.1	26.36	12.0	18.26	9.0	6.40	3.2	456	4.9
Oct.	48,113	22.6	52.58	24.0	40.21	19.9	26.09	12.9	810	8.7
Nov.	39,812	18.7	50.90	23.2	57.22	28.2	43.72	21.6	1,043	11.1
Dec.	25,457	12.0	33.72	15.4	22.63	11.2	41.82	20.6	1,052	11.2
Jan.	11,130	5.2	9.92	4.5	.09	—	9.90	4.9	853	9.1
Feb.	7,881	3.7	3.93	1.8	—	—	8.42	4.2	790	8.4
Mar.	10,144	4.8	5.47	2.5	—	—	8.40	4.1	1,106	11.8
Apr.	7,744	3.6	5.99	2.7	11.38	5.6	4.49	2.2	692	7.4
May	8,480	4.0	10.61	4.8	21.60	10.7	18.87	9.3	709	7.6
June	9,231	4.3	9.32	4.2	13.58	6.7	16.02	7.9	777	8.3
July	4,568	2.1	7.20	3.3	11.40	5.6	10.48	5.2	585	6.2
Total	212,882	100.0	219.46	100.0	202.56	100.0	202.55	100.0	9,371	100.0

* Sources: *Reports on the Grain Trade of Canada*, 1920–24; Theo. D. Hammatt, *Seasonal Aspects of Wheat Exporting*, U. S. Dept. of Commerce, *Trade Information Bulletin No. 350*, May 1925, p. 12.

This study is based upon research work conducted by C. P. Wright, with the collaboration of J. S. Davis during the later stages. In their present form, Sections II–V, VII, and VIII have been written by the former and the other sections by the latter. The statistical tables and charts have been prepared by E. Gail Benjamin, Margaret Milliken, and P. S. King, under the direction of J. S. Davis. The map on page 220 was drawn by L. E. Kemnitzer from official Canadian maps.

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The Institute is fully conscious of the possibility of deficiencies in a study of this character, and will welcome communications from readers calling attention to errors and omissions and supplying corrections and amplifications.

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THE DISPOSITION OF AMERICAN WHEAT SUPPLIES

A CRITICAL APPRAISAL OF STATISTICAL PROCEDURES

I. INTRODUCTION

It is our purpose in the ensuing pages to present an appraisal of the knowledge available through statistics of the disappearance of wheat and the appearance and disposition of flour in the United States, and to suggest certain lines of possible improvement in the statistical procedures whereby this knowledge is obtained. Some phases of the problem can only be suggested; and others deserve more complete analysis than is attempted in this paper or is possible at this time.

Introduction
Statistics of Wheat Supplies
Measures of Disappearance and Consumption
Data on Flour Milling
Unreliability of Current Data on Consumption
Forecasts of Wheat Disappearance, March–June
Seasonal Variations in Flour Output and Export
Conclusions

DEVELOPMENT OF STATISTICS

Before the war the statistics of wheat, like those for most other commodities, were both deficient and defective. The United States Department of Agriculture issued (1) an estimate of planted acreage; (2) an estimate of abandonment of winter wheat acreage; (3) monthly reports on condition during the growing season; (4) preliminary crop estimates; and (5) a final crop report. These data were based largely on returns from numerous crop correspondents. Every ten years the census figures of the Department of Commerce were used to revise the crop estimates of the Department of Agriculture and to provide a new base for subsequent estimates of acreage, crops, and yields per acre.

The Department of Agriculture also issued, as of March 1 and July 1, estimates of (a) wheat on farms and (b) wheat in country mills and elevators. The former were based upon returns from crop correspondents, taken in conjunction with the estimate of the preceding crop. The latter were based upon reports from a large number of country mills and elevators, taken in conjunction with their estimated importance in the entire business. The Department of Agriculture further published (c) trade reports of monthly receipts and shipments in the leading wheat markets; and (d) trade estimates, all incomplete and not altogether comparable from time to time, of the wheat in visible positions. The three figures of wheat stocks were used to reach an estimate of the gross wheat carryover at the end of the crop year, June 30.

The figures for imports and exports of wheat and wheat products, issued by the Department of Commerce, were inconsistent and erroneous, largely as the result of confusion in the data regarding transit shipments across the Canadian border.

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Beginning with 1849, the decennial and quinquennial censuses of manufactures contained segregated but not always comparable reports on flour milling. Between the census years, milling journals published figures for estimated grindings by larger mills in important milling areas. Concerning flour stocks, conjectures were made but nothing was really known.

After the United States entered the war, the administration of the United States Grain Corporation introduced important and necessary improvements into wheat statistics. Comprehensive catalogues of country, central terminal, and port elevators, and of country and city flour mills, were prepared, with ratings of capacities. Throughout the period of the war, reports were made of threshings, of shipments from farms, of primary receipts, and of shipments from elevators to mills and terminals. Stocks of wheat and flour were followed into all positions. Losses in cleaning of wheat, wheat fed on farms, wheat used for seed, and farm reserves were studied and appraised. From the operation of the United States Grain Corporation one could draw a picture of crop, stocks, and movements of wheat such as we had never before possessed. Wheat ground to flour was reported regularly and in detail—a routine made relatively easy by the fact that mills were making a straight flour. By a process of subtraction, an estimate of wheat unaccounted for was prepared for the years 1917–18 and 1918–19. One principal point in the statistical improvements was the estimate of wheat ground by mills, appraised with a care never before exercised even in a decennial census.

Since the war most of the special statistical procedures introduced by the United States Grain Corporation have lapsed, for lack of authority and funds to continue them. Nevertheless, during the past four years the appraisals and tabulations of the Department of Agriculture in respect to wheat have been improved in quality and amplified in scope. The import and export figures have likewise been improved, under the present administration of the Department of Commerce with the coöperation of Canadian authorities. The confusion that previously existed in relation to trade across the international boundary has been largely eliminated, and we now know what proportion of wheat and flour, proceeding overseas from the ports, originates in each country. Since July 1923, the Department of Commerce has conducted a monthly census of flour milling, including estimates of wheat ground and flour and grain offal manufactured.

Wheat flour was not one of the first of manufactured agricultural commodities to receive regular statistical attention. Under authorization of special legislation, the Department of Commerce in 1914 established regular statistics of cotton. There is a record of ginning, to which a record of threshings of wheat would be comparable. The outturn of cotton, as recorded by the ginning statistics, is regarded as the crop; and after adjustment for imports, exports, and carryover, this figure represents the annual domestic supply. A special monthly report includes cotton consumed, cotton on hand in storage and in consuming establishments, and cotton spindles active, together with additional figures for consumption and storage of linters. Corresponding reports are issued for cottonseed—the crop secured after ginning, received at mills, crushed, on hand at mills and in public warehouses, together with segregation of the production of milling into hulls, linters, hull fibres, crude and refined oil, cake and meal. Somewhat comparable statistics (not yet so developed or complete) are compiled and issued for hides, skins, and leather, including raw materials, tanning, production of different classes and various semi-finished products, together with stocks in different states and positions. The Millers' National Federation is now undertaking to compile and issue at intervals comparable reports on wheat flour. The Bureau of the Census, beginning with 1925, reports wheat and flour stocks in the hands of grinding-reporting mills on June 30.

Need for Improved Statistics

Despite the fact that our information, in quality and quantity, is much superior to that of ten years ago, a fundamental defect

in the procedure persists. This is the traditional method of estimating consumption secondarily from the disappearance of the raw material, rather than primarily from the appearance of the manufactured product. The Department of Agriculture has always measured the disappearance of wheat rather than the manufacture and disposition of wheaten products. From the estimates of several items of disappearance has been derived a guess at the volume of human ingestion of wheaten breadstuffs. The data on cotton and hides give a continuous picture of crop—raw material, movement, disposition, utilization and manufacture, stocks and destination—much superior to anything we possess for wheat.

Something comparable is needed for wheat. By the use of the traditional method of calculating consumption indirectly, all the plus and minus errors in the usual estimates ultimately affect the figure for consumption and introduce there a spurious suggestion of widely fluctuating ingestion of flour. The figure for human consumption is placed at the mercy of the crop reporter; the estimates of wheat fed to animals are employed to determine the wheat fed to human beings; and a high or low dockage affects the figure for bread. When later a revision of crop or carryover is made, the figure for human consumption must again be adjusted accordingly. The correct procedure is to have a direct census of flour production, in order to eliminate errors in the flour consumption figure due to the fluctuations of estimates of crops, carryovers, and wheat fed to animals and wasted.

To a considerable extent, developments in future trading and coöperative marketing have their origins in lack of knowledge of movement, manufacture, and stocks of wheat and wheaten products. Price interests of producers and consumers alike are involved. Wheat growing may be considered primarily as a basic agricultural occupation, with flour milling as the terminal step. It may also be considered as the source of raw material for a basic national industry designed to supply the largest single item in the list of foodstuffs. In the first view, it may be compared with copper mining; in the second, with iron mining. However one conceives the industry, wheat growers and dealers need to know, through direct statistical procedure rather than through indirect inference, what becomes of the crop. It is pertinent to observe that in the sister industry of sugar, the primary concern of statistics has been the outturn of refined sugar; the secondary concern has been the crop of sugar-cane and sugar-beets.

The German War Experience

It is pertinent to conclude this introduction with an historical observation. During the war Germany suffered a tragic disillusionment in the official expectation of her bread supply. Before the war Germany possessed crop reports of wheat and rye, estimates of domestic wheat and rye used as seed and fed to domesticated animals, estimates of wheat and rye employed in the manufacture of alcohol and in other industries, and records of imports and of exports of breadstuffs. She also possessed milling statistics, which, like ours, were so submerged that the bread-grain consumption of the country was customarily inferred from the bread-grain supply. Suddenly, in the winter of 1916–17, the Food Controller of Germany awoke to the fact that the country did not possess the flour that should have been available according to the crop reports. From that time on, the statistical practice of the country was reversed, and the bread-grain crop of the country and the bread supply of the population, were in effect deduced from the flour production. Thereafter the German Food Administration had less flour, but it was real flour and not statistical flour. Since the war there has been sharp discussion as to whether the surprising exaggeration of the bread-grain supply was due to overestimate of the wheat and rye crops or underestimate of the wheat and rye fed to domesticated animals.[1] It is the present conviction of authorities in Germany, within the government and without, that the

[1] Karl Ballod, in *Schmoller's Jahrbuch*, 1915, XXXIX, 77 ff, and 1916, XL, 75 ff; A. E. Taylor, "Pre-War Crop Estimates in Germany," *Agriculture Yearbook, 1919*, p. 61; Kurt Ritter, *Deutsche Allgemeine Zeitung*, Nov. 13, 1923.

pre-war crop estimates, including those of the years 1914, 1915, and 1916, were 10–15 per cent in excess of the real crop. Upon this statistical fiction—estimating the bread supply from the wheat crop instead of from the flour production—the German Government risked the food supply of the country in the war.

II. STATISTICS OF WHEAT SUPPLIES

The statistical items on the supply side are essentially two in the United States: the estimate of crop, and the estimate of stocks, including carryover.

The Crop Estimate

The subject of estimating the wheat crop is too large to be discussed in this paper except as incidental reference must be made to the estimates. It is necessary, however, to mention certain broad considerations and to note the regional division of our wheat production, because of its bearing upon statistics of movement and position.

The estimate of crop has a double influence on the estimate of consumption. In a country like the United States the utilization of wheat, including feed use and losses as well as human consumption, to some extent increases with plenty and declines with scarcity. So long as the figure for human consumption is obtained by a series of subtractions, an overestimate of the crop exaggerates the figure for human consumption, while an underestimate of the crop has the contrary effect. A consideration of circumstances leading to over- or underestimate of the crop lies outside of the scope of the present discussion. The radical revisions of the figures for wheat crops made by the United States Department of Agriculture after the last decennial census are fresh enough in the memory of the trade.[1] The sum of the crop and the carryover constitutes the supply for the year. These are both subject to plus and minus errors, which may in different years be opposed or be in the same direction. Since the crop is so much larger than the carryover, it has been natural to suppose that error in the crop estimate is more important than error in the carryover. Nevertheless, an error in the carryover may have a larger immediate meaning to the market, in a particular season, than an error in the crop report.

[1] The wheat crops of 1919, 1920, and 1921 were revised upward by 34, 46, and 20 million bushels respectively. There is considerable conviction in the grain trade that even these revisions were insufficient.

Regional Divisions of the Wheat Crop

The country is naturally divided into four wheat regions: the eastern soft-winter-wheat region; the northwestern hard-spring-wheat region; the southwestern hard-winter-wheat region; and the Pacific region. These regions display definite characteristics in wheat production, milling, and trade.

The eastern soft-winter-wheat region includes all states east of the Mississippi, and Iowa, Missouri, Arkansas, and Louisiana. Less than 2 per cent of the average acreage of this region is planted to spring wheat, and the characteristic wheat of the division is so-called red winter wheat, ranging from soft in the East and South to semi-hard in some sections of Indiana and Illinois. This section is a net "importer" of wheat from other states to the extent of 140–160 million bushels. Raising soft wheats, it naturally ships in hard wheats and is to some extent an "exporter" of soft wheat to the other regions as well as to the outside world.

The hard-spring-wheat region includes Minnesota, the Dakotas, Montana, and Wyoming. Here spring wheat is the predominating type, and the winter-wheat acreage is less than 5 per cent of the total. This section is a net exporter of wheat. The annual consumption requirements of the five states in this region (for seed, feed, and food) are little over 60 million bushels, and the exportable surplus (including durum) often is two or three times as much. Although this region is a heavy net exporter of hard wheat and hard-wheat flour, both eastward from Minneapolis and Duluth and westward from Montana, it imports

small quantities of soft-wheat flour from the eastern soft-winter-wheat region. In the treatment of the data of the hard-spring-wheat region, it is highly desirable to have durum wheat consistently and comparably separated from the flour wheats. At present a considerable fraction of durum wheat in the trade, particularly in the case of the tabulation of exports, is lost under the heading of mixed wheat, which is known to consist largely, though indeterminately, of durum wheat.

The hard-winter-wheat belt includes Nebraska, Kansas, Oklahoma, Texas, New Mexico, and Colorado. Less than 5 per cent of the acreage is spring wheat. This region is a heavy net exporter of wheat. The consumption requirements are in the neighborhood of 90 million bushels, and the net exports may be more than double that amount. While the winter wheat is predominatingly hard, enough soft wheat is usually raised in eastern Nebraska and Kansas to supply its trade demands for soft flour.

The Pacific region includes all states west of the hard-spring-wheat and hard-winter-wheat regions. Both spring and winter wheats are raised, to the average extent of two-thirds winter and one-third spring. The predominating type outside of Idaho is soft wheat, but semi-hard wheats are being introduced in order to minimize the otherwise necessary importation of hard wheat or hard flours from the hard-wheat districts. The consumption requirements of the population in the Pacific division are roughly 60 million bushels per year. California and Arizona are ordinarily net import states, while the other states of the division are net export states. Regarded as a unit, the region is a heavy net exporter, the exports flowing out of Pacific ports often overbalancing by 40 million bushels the hard wheat and flour flowing westward across the Rocky Mountains.

The wheats of these four regions are substitutable to a considerable degree, price permitting. Nevertheless their natural qualities, the seasonal relations of the harvests, the geographical factors of transportation and distribution with respect to milling centers and the consuming populations, and the relations of trading in different futures markets make it highly advisable to have the statistics of crop disappearance, movement, and utilization segregated along regional lines. This would mean for each region separate estimates of crops by types and grades, farm reserves, stocks in country mills and elevators, stocks in city mills, visible supplies, exports in terms of variety of wheat, and consumption. The prices are already segregated, but prices cannot reflect the actual state of the commodity until segregated data of movement and stocks are made available. Data of crops, stocks, and movements should be compiled by regions, because the importing areas use more of their wheat locally than do exporting areas; and it is the mobile wheat that it is desirable to have determinable.

Wheat and Flour Stocks

In the stocks of wheat at any time, and hence in the carryover at the end of the crop year, are five items: (1) farm reserves of wheat; (2) wheat stocks in country mills and elevators; (3) wheat stocks of city mills; (4) the visible wheat supply (in specified second hands); and (5) flour stocks. The available data on these various items have been developed traditionally and unevenly. They now reflect for wheat the imperfect development of statistical procedures that are much more perfectly carried out for cotton and hides by the Department of Commerce.

Farm Reserves of Wheat

The estimate by the United States Department of Agriculture is not based upon enumeration, but upon percentages of the preceding crop as adjudged by crop reporters. When scrutinized, it is seen to contain the elements of estimates of acreage, of crop yields, and of the farm reserves of the previous year. This is an old form of estimate, extending back into the last century. It has been issued as of March 1 and July 1, and is subject to revision, either by later revision of the crop estimate or by revision of the percentage of reserves. It covers presumably all wheat, of whatever quality and grade on farms or in possession of farmers, including seed, animal feed, grain destined

for custom grindings, and unsold merchantable wheat. No estimate of the fraction of farm reserves consisting of merchantable wheat is compiled. The estimate of March 1 includes the spring-wheat seed for that season; that of July 1 includes any winter-wheat seed that may be carried over into the new season. Stocks on farms are likely to vary with the psychology of rural crop reporters.

Though it in no sense carries the conviction of an enumeration, the estimate of farm reserves might be made much more useful if two improvements could be undertaken, in addition to the standardization and improvements of technique now in process of development. The first would be the issue of such an estimate as of December 1. Comparable figures of farm reserves on December 1, March 1, and July 1 would contribute to our knowledge of the velocity of marketing of wheat, would furnish additional criteria by which figures of inspections, receipts at primary markets, and shipments might be judged, and would yield indications of seeding. Conversely, inspections, receipts at primary markets, and shipments might be used to check against farm marketing, but only as indices and not measurements. This would be the case particularly if revisions of estimates of farm reserves might be made regularly and promptly.

The second improvement to be desired consists in the segregation of farm reserves. A segregation of farm reserves by regions, and particularly as of December 1, March 1, and July 1, instead of March 1 and July 1 only, would contribute valuable information concerning the rate of disappearance of the several kinds of wheat. Closely connected with farm reserves is the estimate of wheat fed to animals. This is more fully discussed below (p. 308). There is no known method of judging the plus or minus error in the estimates of farm reserves or of wheat fed to animals.

An estimate of wheat marketed from farms, as of December 1, would be of particular advantage. This could be developed by the Department of Agriculture, utilizing inspections, receipts, and shipments as indices, provided that an estimate were made of wheat on farms as of December 1. It ought to be feasible to use data on shipments from farms to check up estimates of crop, seed, animal feed, and reserves. Proceeding further, it ought to be feasible to use mill grindings and exports to check up farm shipments.

Out of the official Canadian reports on inspections, elevator stocks, receipts, and shipments at country elevators, at interior terminal elevators, and at public and private terminal elevators, it is possible to secure a close view of the monthly marketing of wheat from the farms of the prairie provinces. The conditions in the Canadian hard-wheat belt are very much simpler than in the United States. Nevertheless, the importance of the data is such as to make it highly desirable to possess estimates of farm marketing during at least the three periods of the year ending with November, February, and June.

Wheat Stocks in Country Mills and Elevators

Wheat stocks in country mills and elevators are estimates, in part partaking of the nature of enumerations, based on reports from some 3,500 supposedly typical mills and elevators out of something like 30,000 country mills and elevators in the United States.

These estimates are supposed to exclude wheat in private commercial and in public elevators whose stocks are contained in the report of the visible supply. Estimates of wheat stocks in country mills and elevators were made first in 1910 for the March report and in 1917 for the July report, but up to 1918 were based on trade data. The estimate is subject to revision; presumably, also, revisions of the crop and of farm reserves might both find expression in revision of wheat stocks in country mills and elevators. Trade estimates of wheat in country mills and elevators sometimes vary widely from that of the United States Department of Agriculture—as, for example, on March 1, 1925.[1] These stocks are at a minimum on July 1, in the winter-wheat regions, but not in the spring-wheat areas.

[1] Broomhall used the figure of 95 million bushels; the official estimate was 69 million.

The figure for July 1, 1921, was 27 million bushels; for 1922 it was 29 million bushels; for 1923, 37 million bushels; for 1924, 37 million bushels; and for 1925, 25 million bushels. There is no way of estimating the probable error in these figures. In publishing the figure for aggregate country reserves on March 1, 1925, the Department of Agriculture made revisions of the figures for 1923 and 1924 as follows:

(Million bushels)

		1923	1924	1925
Wheat on farms	Original	155.5	133.9	113.9
	Revised	156.1	137.7	
Wheat in country mills and elevators	Original	92.6	90.4	69.1
	Revised	102.9	98.3	
Combined	Original	248.0	224.3	183.0
	Revised	259.0	236.0	

These revisions are upward, but not for reasons that are indubitably inherent in the procedures.

As in the case of farm reserves, the usefulness of the estimates of wheat reserves in country mills and elevators would be greatly increased if an additional estimate were annually compiled and issued as of December 1, and if all such estimates were segregated into the four wheat regions.

Wheat in country mills and elevators is all presumably merchantable wheat, since it would hardly have left the farm if it were tail wheat; but it includes considerable dockage. Most of the wheat reported in country mills and elevators is mobile wheat in the hands of grain merchants or farmers' coöperative associations, but some of these stocks have been purchased by city mills and are essentially mill reserves. It will be important, henceforward, that in the estimate of wheat in country mills and elevators, as of July 1, the attempt be made to state separately the holdings of city mills in country elevators, in order to avoid a duplication in the carryover, since the city mills will on June 30 also make a report of their wheat stocks to the Bureau of the Census.

Wheat Stocks of City Mills

Estimation of city-mill wheat stocks is a new practice, the figure being compiled by the Bureau of the Census this year for the first time. A comparable trade estimate was compiled by the Millers' National Federation, as of January 31 and of June 30. The estimate of the Bureau of the Census, as of June 30, ought to be relatively complete. The lack of this estimate has been a glaring defect in the figure for carryover since the war.

Mills representing 57 per cent of the total grindings, on the basis of the 1923 census, reported to the Millers' National Federation on January 31 that they were carrying some 74 million bushels of wheat. It is to be expected that ordinarily holdings of the mills on June 30 will be less than on January 31. But it is easy to picture circumstances that would induce mills to maintain heavy reserves.

According to the recent announcement of the Bureau of the Census, 956 mills, which in 1923 produced 87.4 per cent of the total flour reported in the census of that year, have made reports of their holdings on June 30.[1] These holdings, adjusted to 100 per cent from 87.4, were as follows:[2]

(Million bushels)

In country elevators	2.5
In public terminal elevators	3.9
In private elevators, in transit, and in mills	30.6
Flour converted into wheat (4.58 : 1)	17.5
Total	54.5

The holdings in country elevators are to be regarded as a duplication of wheat already reported in country elevators by the Department of Agriculture. The holdings in public terminal elevators are to be regarded as a duplication of wheat already reported in the visible supply. Wheat in transit is not reported in the visible supply. Wheat in private elevators and in mills, except in the occasional cases where a mill

[1] The figures for stocks of wheat and flour in mill hands on June 30, compiled by the Millers' National Federation, agree quite well with the figures issued by the Bureau of the Census.

[2] This adjustment is to be accepted with reserve, since it is unsafe to assume, without further experience, that the holdings of non-reporting city mills correspond to those of reporting mills, especially for flour.

elevator is run as a private elevator (cf. the Russell elevator in Minneapolis), is not included in the report of visible wheat. Accordingly, most of the 30.6 million bushels of wheat reported in private elevators, in transit, and in mills is a clear addition to the carryover otherwise reported on June 30 as 87 million bushels, to say nothing of the flour stocks. The addition, to this figure, of 48 million bushels representing stocks not hitherto reported as a matter of public information, gives to the carryover a substantially different meaning.

Mill stocks of wheat on June 30 probably depend chiefly upon three factors—quality of the crop in hand and in prospect, the volume of open flour contracts, and the relative positions of futures prices. If the quality of the old crop is such as to make it difficult for the larger mills to maintain their blends, forehanded organizations will build up stocks to some extent with only secondary reference to prices. As summer approaches the mills will maintain large stocks if the May option sells at a discount under July and July at a discount under September; when little concern is felt as to availability of desirable supplies, stocks will be allowed to run down to a low figure if the May option sells at a premium over July and July at a premium over September. Looking at the matter from the standpoint of the mills, we may easily envisage circumstances that might influence mill holdings of old-crop wheat on July 1 to vary from 10 to 50 million bushels exclusive of flour stocks.

It would obviously be of advantage if the Bureau of the Census would report mill stocks of wheat for the four principal wheat regions, and by classes. It is a particular property of mill stocks of wheat that these represent selections to some extent, and their quality is, therefore, above the average of the crop.

Visible Wheat Supply

There are several trade estimates of the visible wheat supply, of which the most prominent are issued weekly by *Bradstreet's* and the Chicago Board of Trade. The latter gives a summation of individual local records of wheat reported in an unstated and inconstant number of elevators and warehouses (including wheat afloat from lake ports) in twenty-seven places. *Bradstreet's* report includes thirty additional smaller points. The Minneapolis *Daily Market Record* and the Chicago *Daily Trade Bulletin* jointly compile another (monthly), and in some directions more comprehensive, estimate of visible wheat supplies. The reporting agencies have no check on the units, and no attempt is made to have the same number of elevators and warehouses in the various points always included in the report. Under these circumstances, the reports of visible wheat are not closely comparable from week to week or in different years. Each is an indeterminate fraction of an undefined total. In absolute amount, the error is probably lowest on June 30, when visible supplies of wheat are low and the amount rolling on rails and afloat from lake ports is also low.

A survey of the figures for visible supplies over a period of years in the light of market happenings gives one the impression that both unreliability and irregularity have been present in these trade estimates. Such faults are inherent in trade estimates, and can hardly be eliminated except in official estimates. When one compares the trade estimate of visible wheat with the estimates of stocks of cotton and leather issued by the Department of Commerce, one must give expression to the hope that the government may find it possible to compile and issue at stated intervals—for example, on December 1, March 1, and July 1—comparable estimates of visible wheat. These would possess added value if segregated into the four wheat regions and into classes. Such estimates might be compiled either by the Department of Agriculture or by the Department of Commerce through the Bureau of the Census.

Wheat in the visible supply is the most mobile of all wheat in the market. An accurate knowledge of the wheat in visible positions in different parts of the country ought to be obtainable with relative ease. There is at present no possible revision of the estimates of visible wheat. In the preparation of such a report of visible wheat, the government would have the advantage

of the use of the detailed reports on inspections, receipts, and shipments. Such an estimate would report in some detail on the number and character of the warehouses, public or private; and it would be possible to separate visible stocks at ports from mill-area visible stocks.

Flour Stocks

We possess at present no estimates of flour stocks, except those of the trade journals, since the figures in the *Survey of Current Business* of the Department of Commerce are taken from trade sources (Russell).[1] On January 31 the Millers' National Federation obtained by questionnaire an estimate of the flour stocks of members, representing about 70 million barrels' outturn per annum. These stocks amounted to about 3 million barrels. On June 30 of this year the Bureau of the Census collected data on stocks from mills reporting their monthly grindings to the Census, and on the basis of these data flour stocks in the hands of mills may be estimated at 3.8 million barrels. These items should be made a regular item of report, in order that the figure for carryover may be made more complete, the figure for flour stocks to be translated into terms of wheat in accordance with the reported ratio of bushels of wheat per barrel of flour.

Flour stocks in the hands of mills are usually kept as low as possible consistent with contracts and current trade demands; any further storage would be at least semi-speculative. East of the Rocky Mountains unsold mill flour stocks are usually hedged.

Flour stocks not in mill hands lie chiefly in the hands of exporters, jobbers, wholesalers, retailers, and bakers, with an uncertain small quantity in households. Stocks on July 1 are ordinarily relatively low, other things being equal, except that bakers' stocks are likely to be considerable in July–September; but modern flour stores so well that one would expect such stocks to vary widely in accordance with quality of flour out of the old crops, apprehension concerning the quality of flour out of the new crop, and relations of prices. Flour stocks in distributive channels are largely unhedged. When one views the experiences of the Milling Division of the United States Food Administration during the war, one reaches the conviction that as much as 10 million barrels of flour may easily be held in the form of stocks in the distributive trades outside of mill hands; on the other hand, if reasons for hand-to-mouth trading are clearly in evidence, stocks may be reduced to a small fraction of this figure. The United States Department of Agriculture annually reports an estimate (cf. Appendix Table I) of flour stocks, as of July 1, this being drawn apparently from the compilations of the Chicago *Daily Trade Bulletin*. It is interesting to note that this estimate for July 1, 1925, was 1,815,000 barrels, whereas the returns reported for mills alone by the Bureau of the Census for June 30 was 3,829,420 barrels.

Practices in the retail trade are apparently changing. Milling capacity being in excess of grindings, with prompt and dependable transportation by rail and truck, retailers see little reason for carrying stocks. Fearful of the future price movement (which is partly discounted by the willingness of mills to sell at current prices for distant delivery) and confident of immediate delivery of flour on order, retailers naturally buy from hand to mouth. The remaining motive for carrying stocks, where it exists, is largely financial, and unless flour purveyors make unusual terms to retailers, even this works out in the direction of hand-to-mouth buying. When a chain store is able to gauge its flour trade so that an order of flour is sold before the bill is due, for example, within thirty days, this means that so long as flour is purchased on this basis the seller is supplying the capital, since the flour is not paid for until after it is sold. All in all, the tendency in the retail trade is not to carry heavy flour stocks; and this means that our inability to measure stocks in retailers' hands is of relatively less importance. Under these circumstances, an estimate of flour carryover becomes

[1] Reports of flour stocks from sources of information in the trade are regularly assembled by A. L. Russell, the *Northwestern Miller*, and the Chicago *Daily Trade Bulletin* and the Minneapolis *Daily Market Record*. These do not possess identical bases and are not strictly comparable.

more feasible, since the stocks in the hands of mills, wholesalers, and factors are more visible than those in the hands of retailers.

So far as bakeries are concerned, we are also in a stage of transition. The emphasis on high-protein flour works in favor of flour reserves by large bakeries. Price fluctuations react in the direction of low stocks held by small bakeries. The effect on flour stocks to be anticipated as the result of consolidations of bakeries into large country-wide organizations cannot yet be foreseen.

In any event, there is at present no method of estimating flour stocks in distributive channels, and the only adjustment possible is to regard them as high or low, on the basis of trade considerations, and to regard the carryover in as balancing the carryover out. The economies in use of flour that attend high prices are accomplished to a large extent on the flour stocks in the hands of retailers; and hand-to-mouth buying by retailers reacts profoundly back to the mills.

The considerations presented in the preceding paragraphs make clear the certainty of the omission of several variable items from the published estimates of carryover and the probability of duplications in the several items that ought to be considered in the carryover. It should be possible to do much toward completing and perfecting the estimate of this basic figure, though flour stocks in distributive channels will probably remain an unknown item.

III. METHODS OF MEASURING WHEAT DISAPPEARANCE AND CONSUMPTION

The amount of flour produced has no direct relation to the amount of wheat produced; but since by the traditional procedure practically all items in disappearance, outside of the visible, depend on the crop estimate and in effect are derived directly or indirectly through the crop estimate, this traditional method purports to make the volume of flour a function of the volume of wheat.

There are three ways of measuring the volume of a manufacture. One is to measure the raw material utilized. The second is to make an enumeration of the outturn of the product. The third is to ascertain the consumption of the manufactured article, with adjustment for stocks and foreign trade. Each of these is theoretically available in the case of flour, but no one of them has been carried through with precision for any length of time.

The third method is the most difficult. Except for the period of the United States Food Administration, we have little data on the subject from the side of the consumer. The historical method of estimating flour production has been to subtract from the crop of wheat every other conceivable item and then regard the remainder as wheat passing into the manufacture of flour. We have had censuses of flour milling every five years since 1899, and biennially since 1919. Since July 1923 we have had a monthly census of flour milling. It is possible, despite the paucity of the statistical data, to discuss the advantages and disadvantages of the several avenues of approach. It is important to do this in order that the future development of our statistical information may be guided by a realization of the defects of the present position.

Five pieces of information are theoretically requisite:

(1) The amount of wheat milled into flour and by-products. This is in 60-pound bushels, and the wheat reported as going into milling is thus comparable, presumably, with the wheat reported in the crop estimate.

(2) The weight of flour secured from the stated weight of wheat. This is in barrels.

From (1) and (2) we secure the average ratio of bushels of wheat per barrel of flour.

(3) The seasonal rate of flour outturn throughout the year. This is measured in the mills by the day's output, and daily figures are added to form figures for weeks and months.

(4) Stocks of flour carried into and out of the milling year. This is now to be obtain-

able as an approximate census enumeration, as of June 30, of stocks in mill hands. It does not take into account flour stocks in the wholesale and retail trade; nor stocks of householders which under normal circumstances may be assumed to be relatively constant and rather low in midsummer, but under circumstances of abnormal prices might be notably above or below a normal figure.

(5) Segregation of consumption into three groups:[1]

(a) Flour consumption by manufacturers of bread, cakes, pastry, biscuits, crackers, etc., for ready-to-eat sale to households.

(b) Flour consumption in hotels, restaurants, dining cars, public eating-places, and institutions.

(c) Flour consumption by households, being purchases of raw flour.

Current Statistical Procedures

Now what are the procedures currently employed? It has been customary to formulate the situations of wheat and flour combined. A brief summary of the older practice of the Department of Agriculture is as follows:

Supplies	
Crop	a_1
Carryover into crop year	a_2
Imports, wheat and flour (as wheat)	a_3
Total	A
Disposition	
Exports, wheat and flour (as wheat)	b_1
Carryover out of crop year	b_2
Total	B
Balance for domestic utilization	X
Population	Y
Utilization per capita	x

For commercial purposes more detail is desirable both as to volumes and movement, and such statements are prepared to indicate the current position as well as the position at the close of the crop year. A good illustration of such a current statement is that of Russell, as follows:

[1] This phase is not discussed in this paper.

Supplies	
Crop and farm reserves	a_1
Stocks at elevators, mills, and terminals, July 1	a_2
Receipts from farms since July 1, estimate	a_3
Imports, domestic account	a_4
Total	A
Disposition (except carryover out)	
Exports, U. S. grain from July 1	b_1
Ground by mills, same time	b_2
Total	B
Balance	
Stocks on hand and in transit	X
Of which at terminals	x

Another commercial formulation is that of the *Northwestern Miller,* as follows:

Supplies	
Carryover, wheat	a_1
Carryover, flour as wheat	a_2
Crop	a_3
Imports, wheat	a_4
Imports, flour as wheat	a_5
Total	A
Disposition (except human consumption)	
Wheat exports	b_1
Exports of flour as wheat	b_2
Carryover, wheat	b_3
Carryover, flour as wheat	b_4
Reserved for seeding	b_5
Waste, feed, and loss	b_6
Total	B
Balance for domestic utilization	
As wheat	X
As flour *(barrels)*	x

The Division of Historical and Statistical Research of the federal Bureau of Agricultural Economics uses a different formulation, with more detail, as follows:

Supplies	
Carryover in:	
Stocks on farms, July 1	a_1
Stocks in country mills and elevators, July 1	a_2
Commercial visible (Bradstreet's), July 1	a_3
Stocks of flour (in terms of wheat), July 1	a_4
New crop	a_5
Imports (flour included), July 1 to June 30	a_6
Total	A

Disposition (except for food and feed)	
Exports, July 1 to June 30 (flour included)	b_1
Estimated seed requirements	b_2
Carryover out:	
On farms, June 30	b_3
In country mills and elevators, June 30	b_4
Commercial visible (Bradstreet's), June 30	b_5
Flour (in terms of wheat)	b_6
Total	B
Disappearance for food and feed	X
Population	Y
Per capita disappearance, food and feed *(bushels)*	x

The tabulation of the Department of Agriculture brings into clear relief the factors of this segregation that are at once illogical and inchoate from the standpoint of consumption. There is no item for dockage, wastage, or losses; these and the disappearance for food and feed are all lumped into one figure. It would be almost as illogical to estimate coal production not by the tons carried over railroads from pit-heads, but by the yardage of coal seams excavated in the mining operations, including in the figure for coal disappearance the volume of culm that annually accumulates outside the pit-heads.

Proposed Formulations

From the standpoint of wheat as raw material for manufacture, the following represents a correct form of statement:

Supplies	
Crop	a_1
Carryover in, wheat	a_2
Imports, wheat	a_3
Total	A
Disposition	
Milled	b_1
Exports, wheat	b_2
Carryover out, wheat	b_3
Total	B
Remainder	C
Seed	d_1
Feed	d_2
Waste, losses, dockage, unaccounted for	X

Two alternative methods of accounting for the disposition of wheat are shown below. In the table of disappearance, the burden of cumulative error falls on flour milling; in the table of manufacture it falls on a fraction unaccounted for.

Table of Disappearance

Supplies	
Carryover in, July 1:	
(a) Farm reserves	a_1
(b) In country mills and elevators	a_2
(c) Stocks of city mills	a_3
(d) Commercial visible	a_4
New crop	a_5
Imports	a_6
Total	A
Disposition	
Exports	b_1
Used for seed	b_2
Industrial use	b_3
Waste, spoilage, losses	b_4
Fed to animals	b_5
Carryover out, June 30:	
(a) Farm reserves	b_6
(b) In country mills and elevators	b_7
(c) Stocks of city mills	b_8
(d) Commercial visible	b_9
Total	B
Available for flour milling	X

Table of Manufacture

Supplies	
Carryover in, July 1:	
(a) Farm reserves	a_1
(b) In country mills and elevators	a_2
(c) Stocks of city mills	a_3
(d) Commercial visible	a_4
New crop	a_5
Imports	a_6
Total	A
Disposition	
Exports	b_1
Used for seed	b_2
Industrial use	b_3
Ground into flour	b_4
Carryover out, June 30:	
(a) Farm reserves	b_5
(b) In country mills and elevators	b_6
(c) Stocks of city mills	b_7
(d) Commercial visible	b_8
Total	B
Unaccounted for as waste, spoilage, losses, and animal feed	X

It is further expedient and practicable to separate flour and wheat. A serviceable method of separation is shown below:

DISTRIBUTION, UTILIZATION, OR DISAPPEARANCE OF WHEAT, JULY 1–JUNE 30

Supplies	
Carryover in, July 1:	
(a) Farm reserves	a_1
(b) In country mills and elevators	a_2
(c) Stocks of city mills	a_3
(d) Commercial visible	a_4
New crop	a_5
Imports	a_6
Total	A
Disposition	
Exports	b_1
Used for seed	b_2
Industrial use	b_3
Ground into flour	b_4
Carryover out, June 30:	
(a) Farm reserves	b_5
(b) In country mills and elevators	b_6
(c) Stocks of city mills	b_7
(d) Commercial visible	b_8
Total	B
Waste, spoilage, losses, fed to animals on farms	X

FLOUR PRODUCTION

Supplies	
(Wheat ground)	(a_1)
Flour outturn	a_2
Flour imports	a_3
Flour stocks, July 1	a_4
Total	A
Disposition	
Flour exports	b_1
Flour absorbed by trade	b_2
Flour stocks, June 30	b_3
Total	B

It will be advantageous to conclude this discussion with tabular presentations of the data for the year 1924–25, though some of the estimates are still provisional and subject to revision. The supply and disposition of wheat, provisionally issued in a press release, according to the United States Department of Agriculture was as follows:

(Million bushels)

Supplies			
Crop			873
Carryover	farm reserves	31	107
	country mills and elevators	37	
	visible	39	
Imports	wheat for consumption		6
	wheat for grinding for export		
	flour as wheat		
Total			986
Disposition			
Seed			88
Exports, wheat			195
Wheat milled			540
Fed to animals			75
Carryover	farm reserves	30	87
	country mills and elevators	25	
	visible	32	
Total			985

This deviates from previous practice by the inclusion of a figure for wheat milled obtained from the Bureau of the Census. It includes, however, no estimate of city-mill stocks. If the item of wheat fed to animals was a primary estimate, the agreement between the totals is of course fictitious. Otherwise this indicates that all of the losses have been included in the item "fed to animals."

The supply and disposition of wheat, according to the data of the United States Department of Agriculture and the Bureau of the Census, employed in accordance with the views herein expressed, are as follows:

(Million bushels)

Supplies			
Crop			873
Carryover	farm reserves	31	107
	country mills and elevators	37	
	visible	39	
	city-mill stocks unreported		
Imports	wheat for consumption		6
	wheat for grinding for export		
	flour as wheat		
Total			986
Disposition			
Seed			88
Exports, wheat			195
Wheat milled			540
Carryover	farm reserves	30	135
	country mills and elevators	25	
	visible	32	
	city-mill stocks (excluding clear duplications)	48	
Total			958
Farm uses and losses			28

The presence of an item of city-mill stocks in the outgoing carryover, without a corresponding item in the incoming carryover, is a glaring inconsistency. Since city-mill stocks were not reported in the carryover in July 1924, the residual figure of 28 million bushels for farm uses and losses is too low by at least that unknown amount. This formulation has the obvious advantage of presenting the four most verifiable items in the disposition (seed, exports as wheat, mill consumption, and carryover), leaving the least verifiable items (fed to animals, losses, and wheat unaccounted for) under one heading, the size of which, if incongruous, will reflect back to the figure for the crop, rather than to the principal items in disposition. A year hence it will be possible to present a perfected statement of the position of that date, because city-mill stocks will be available for both carryovers.

Contrast Between Wheat Production and Flour Production

It is important clearly to realize that production and disappearance of wheat and production and consumption of flour are not comparable processes, when contrasted from the standpoint of the market procedures by which supply and demand are equated in price. Commodities may be divided into two groups according to whether production is confined to a limited season or is continuous. With a season's production unforeseeable and uncontrolled, it is assumed that the product is placed on sale during the year; it is this fixed supply, set against the effective demand, that is equated in the current price. With continuous production both controllable and to some extent foreseeable, the product set out for sale during the year may be adjusted to the effective demand; the price may be raised or lowered to some extent by contracting or expanding the production. Wheat belongs to the first type of commodity, flour to the second. The grower must harvest the yield nature has provided; the miller needs to grind only what he can sell.

The wheat crop becomes available during a harvest season of four months. Wheat is relatively non-perishable, may be stored and shipped at all seasons, and is a highly mobile commodity. The practice of future trading on grain exchanges enhances this mobility. Therefore, under normal circumstances, despite the fact that wheat is shipped from the farm more heavily in the fall than throughout the remainder of the year, it is broadly correct to say that the bulk of the crop of wheat is offered for sale at one time. The effects of physical mobility, hedging, and speculation normally reduce the monthly variations in prices to little more than the carrying charges; in effect, the merchandised crop is thus placed on sale at once. This statement must be qualified by the facts that the farmer may withhold a variable amount of wheat from the market and dispose of it on the farm; and that a variable amount may pass from one crop year to another in the form of carryover. With these qualifications, it may be said that the annual outturn of wheat is normally placed on the market for sale at one time, to meet the purchasers of wheat, who are continuously in the market, supplying a somewhat variable but continuous demand for the manufactured product.

The buyers of wheat may be classed under four heads: (1) flour mills; (2) grain merchants who act as factors, brokers, or jobbers, usually hedging their transactions, and selling to exporters, millers, and other users; (3) fobbers and exporters making purchases for immediate loading or prospective cargoes; and (4) speculators purchasing wheat to hold for a rise. The last-named group is only an occasional buyer of wheat in notable amounts, as in 1924–25. The other three groups are continuously in the market for amounts of wheat that are variable from month to month. Buying of wheat and flour, when hedged, does not influence price in the sense of equating the supply and demand, since a purchase of cash wheat is approximately offset by the sale of a wheat future in corresponding amount.

The manufacture of flour is a continuous operation, with only moderate variation from season to season and even from year to year. In a wheat-surplus-producing country like the United States, the physical supply of raw material may be regarded

almost as a constant, in quantity if not in quality. Most mills try to maintain a certain volume of operation. But they are also compelled to adapt operations to fluctuating trade demand for flour. The monthly operations of large mills are compromises between these two positions. Technically considered, the volume of operations is determined by the advantageous use of the capacity of the mill and by the demand for flour, and has practically nothing to do with the quantitative supply of wheat. A comparison of actual grindings with capacities of flour mills[1] and with flour sales, week after week throughout the year, would make this clearly evident, since current grindings frequently exceed current and contract sales. The annual production of flour is thus not to be regarded as a total supply placed on sale at one time. The normal demands are fairly well known for each region. Beyond that, mills grind for export when it is of advantage to their particular organizations so to do. Only the largest mills, and these not at all times, are in a position to maintain a relative continuity of operations; most of them slacken or speed up in accordance with demand for flour.

Broadly considered, therefore, in the marketing of wheat, the supply of the year may be regarded as set up for sale at one time. In the marketing of flour, the outturn of the year is determined by the demand for the product, and this is not to be regarded as set up for sale at one time. Beyond a certain point, expansion of milling operations does not necessarily make for economy. A mill not desirous of restricting operations to the scope of demand may undertake to increase demand by grinding to capacity with sale of flour at reduced price. The experiences of recent years, however, have indicated that for the most part this practice proves illusory in terms of monetary return.

IV. DATA ON FLOUR MILLING

The chief source of our information concerning the volume of flour milling is the reports of the Census Bureau, supplemented by reports and estimates prepared by milling journals and special statistical service.

The Census of Flour Milling

A census of flour milling should report three essential facts: (1) the volume of wheat ground; (2) the weight of flour produced; (3) the monthly rate of grindings.

The amount of wheat ground is influenced by the quantities of wheat of different qualities in the crop, by home demand, and by export demand. The weight of flour produced out of the wheat ground represents the average extraction, largely the expression of the quality of the crop and the flour specifications of consumers. The seasonal rate of grinding is the expression of several influences including administrative stocks at the opening of the season, the rate and volume of wheat marketing, relations of transportation and power, and the trend of flour sales. The grindings of July–December inclusive always exceed those of January–June inclusive, though the amount varies from year to year.

The weighted flour value of a wheat crop is relatively computable for Canada, but much less computable for the United States. The crop report is in bushels of 60 pounds, and represents therefore an adjustment corresponding to the varying amounts of the several grades of wheat with weights lower than 60 pounds to the legal volumetric bushel. This adjustment is based on appraisal of crop reporters at the source, not on official inspections at the terminals, as is the case in Canada.

The degree to which wheat is cleaned before it is milled depends upon many circumstances. We have five inspection grades of wheat, for which the minimum test weight per volume bushel is allowed to run from 50–51 pounds for No. 5 to 58–60 pounds for No. 1. Total foreign material other than dockage is allowed to run from

[1] On account of persistence of old-type mills, there is a difference between gross capacity and what may be termed economic capacity.

7 per cent for No. 5 to 1 per cent for No. 1; and matter other than cereal grains from 5 per cent for No. 5 to 0.5 per cent for No. 1. Heat-damaged grain is allowed to run from 3 per cent for No. 5 to 0.1 per cent for No. 1. Total damaged kernels are allowed to run from 15 per cent for No. 5 to 2 per cent for No. 1. The five grades represent a varying gradation in quality, always more or less unsatisfactory, and one that by no means always corresponds to similar gradation in flour yield. Each variety is allowed to contain wheats of other varieties from 10 per cent for No. 5 to 2 per cent for No. 1, and sometimes these admixtures have an unusual effect on the flour yield as well as on the quality of flour. In different years and in different regions, these admixtures fluctuate rather widely, sometimes in the upward direction, at other times downward, and the mills must adapt their practices accordingly. One of the results of these adaptations is to be found in the yield of flour per bushel of wheat. The miller naturally endeavors to keep his flours uniform, but may be induced to shade the extraction upward or downward according to the prices of flour and mill-feeds.

The decennial census is an actual enumeration of flour grindings, including merchant mills and customs mills, reported separately, having an annual outturn of a value exceeding $500. The biennial census of milling is now confined to reports from merchant mills, excluding all establishments the value of whose products is below $5,000 per annum. This gives a lower figure than would be obtained by the method of the decennial census, depending upon increases or decreases in establishments and shifts of establishments above or below the $5,000 reporting line. When it becomes possible to check the results of several successive biennial censuses against two decennial censuses, the varying relations of the partial censuses to the more complete census will become evident. Most likely these variations are negligible, since the wheat flour produced in customs mills and in merchant mills having an outturn of a value of less than $5,000 per annum is small and probably relatively constant.

The monthly census of milling has a scope more limited than the decennial or biennial census, since it includes only merchant mills manufacturing at the rate of 5,000 or more barrels of flour annually. A careful comparison of the unpublished individual reports of the monthly and the decennial census would indicate the number of mills whose operations lie between the value of $5,000 per annum and the volume of 5,000 barrels per annum, the amount of flour included in this zone, and the proportion it bears to the total outturn.

The monthly census of flour milling includes two running tabulations: (a) the number of mills reporting with an outturn for the month at the rate of 5,000 or more barrels of flour annually, and (b) a comparative statement for the identical mills reporting each month, with a figure for the relation of the outturn of these mills to the total wheat flour reported in the last decennial census. (See Appendix Table VI.) The number of mills reporting monthly has thus far varied roughly from 1,000 to 1,100. The number of mills included in the comparative statement is around 950, and these produced in 1923 approximately 87 per cent of the total wheat flour reported for that year. Assuming that the relations between reporting and non-reporting mills and between the groupings of mills remain relatively constant and comparable, one should be able at the end of the year to secure from the data of the monthly census of flour milling a computed figure for total flour production for the year that may be compared with figures from the quinquennial and biennial censuses, as shown below:

	1909 [a]	1914	1919 [a]	1921	1923	1924	1923–24	1924–25
Wheat ground (*million bushels*)	503.5	545.8	618.7	521.2	558.1	557.4	573.7	539.1
Flour outturn (*million barrels*)	107.1	116.4	133.7	110.8	113.5	120.8	123.9	117.7

[a] These figures include customs mills not reported in the other years. The 1909 figures, excluding customs mills, are 496.5 for wheat and 105.8 for flour. The 1919 figures, excluding customs mills, are 612.6 for wheat and 132.5 for flour.

Since these various censuses have not identical bases of enumeration, is it possible to make them comparable?

It is possible to secure an approximate estimation of the volume of unreported

milling in customs mills and in small merchant mills. In the census of 1919 customs mills were reported as having ground 6,105,047 bushels of wheat and as having produced 1,205,068 barrels of flour. These figures were slightly smaller than the corresponding figures in 1909. The merchant mills with an outturn of less than 1,000 barrels turned out 869,831 barrels, from 5,495,584 bushels of wheat. Since the mills turning out over 1,000 barrels per year correspond fairly closely with the mills turning out a product valued at over $5,000 per year, this would mean, other things being equal, that the reports of the biennial censuses have missed about 11.6 million bushels of wheat ground and 2.1 million barrels of flour included in the decennial census. This would indicate that the biennial census of 1921, and presumably of 1923, missed about 2 per cent of the flour reported in 1919. Strictly speaking, to this must be added the outturn of mills with an annual value of under $500, unreported in all; but this may probably be regarded as negligible.

There is no definite way of knowing just how conditions have changed since 1919. One hears the suggestion that higher freight rates may have stimulated milling in small country mills. On the other hand, competition in flour selling has never been more intense than during the past few years, and this is not favorable to country milling.

Russell and the *Northwestern Miller* have attempted to adjust the census figures in such a way as to represent what they believe to be the total production. The *Northwestern Miller*,[1] on the basis of census comparisons, suggests that the average monthly census estimate of flour production is 81 per cent of the probable total for all wheat flour mills in the country. A. L. Russell[2] believes that the adjusted estimate of the Bureau of the Census, if raised by 5 per cent, would approximate the probable total production. Adjustment for an increase of 2 per cent has been demonstrated to be necessary, but how much more is not demonstrable. The various figures for the last two fiscal years may be contrasted as follows:

(Million barrels)

	1923-24	1924-25
Bureau of Census, raised to 100 per cent	123.9	117.7
The above, plus 2 per cent	126.4	120.1
Northwestern Miller	129.5	129.7
A. L. Russell	130.1	123.6

The discrepancy is slight in 1923–24, but noteworthy in 1924–25.

An increase of somewhere between 2 and 5 per cent represents the adjustment apparently necessary to bring the figure for annual flour production based upon the monthly reports of the census up to the probable total. There is little profit in discussing this adjustment, which will probably be clarified by an additional year's experience with the monthly census and the forthcoming results of the biennial census of 1925.

Once the figure for flour supply is secured (meaning by this outturn of flour minus net exports, adjusted for carryover in and carryover out), the next step would be to segregate consumption into the three main fractions indicated above (p. 299).

Other Data on Flour Milling

Additional data on the course of flour milling would be highly desirable, though differences of opinion may be expected as to whether these ought to be secured through the Census Bureau or through the trade association. It may be taken for granted that the statistics of flour milling, like those of other major industries composed of a large number of operative units, will be expanded either by the Millers' National Federation operating under governmental supervision, or by governmental agencies directly. Desirable additional data would include the following:

(1) monthly outturn of mills, by regions;
(2) stocks in milling hands, by regions;
(3) relation of monthly milling to capacity, by regions;
(4) relation of sales to outturn;
(5) relation of sales to capacity;
(6) stocks covered by hedges.

Concerned with wheat are growers, grain merchants, millers, exporters, bakers, flour dealers. The possession of such current

[1] *Millers' Almanack*, 1925, p. 166.
[2] Personal communication.

data would engender in the minds of each of these groups an objective attitude toward the others, and would tend to reduce waste, increase efficiency, and narrow the spread between the farm price of wheat and the family price of flour and bread.

Bushels of Grain per Barrel of Flour

The outturn of flour per bushel of grain varies considerably from year to year, within the year in different regions, and within a region in different mills. The weight of the wheat per bushel, the variety and quality (whether single or mixed varieties), the percentage of foreign materials (including dockage of all kinds), and the degree of inclusion of frosted, shrivelled, immature, smutted, bin-burnt, or other damaged grains, the water-content of the grain and of the milled products—all affect the outturn. The milling census is based on bushels of 60 pounds as bought. These are weighed by the mill, then cleaned, and the clean wheat weighed. The cleaned wheat is then tempered and in many mills weighed again before being ground. Some of the screenings and cleanings go into the mill feed; others go into feed mixtures. Finally, the relations of prices of flour and mill feed may exert influence on the extraction. In theory, the price of flour is fixed after the returns from sales of mill feed are subtracted from total costs; but in practice, mills may extract higher if mill feed is cheap and may extract lower if mill feed is dear.

The variations in outturn of flour per unit of wheat are not only annual but also monthly. There is a seasonal trend in the quality of grindings due to the obvious fact that most mills purchase month by month and do not secure the grain for a year's program at one time. We have census records of variations in the annual ratio, extending from 4.61 to 4.91 bushels to the barrel of flour. A scrutiny of the details of the monthly milling reports issued by the Department of Commerce (to be found in the Appendix) indicates that during the past two crop years the amount of wheat to the barrel of flour has fluctuated from 273.6 to 279.6 pounds. These are the fluctuations in seasons of large available supplies.

These variations in the utilization of wheat in milling cannot be disregarded, since they run into substantial figures. The error thus introduced is not the same for the consideration of flour milling and wheat crop. We observe variations, according to census returns, of .3 of a bushel of wheat per barrel of flour. A hundred million barrels of flour required 463 million bushels of wheat in 1919 and 491 million bushels in 1923. If one were to subtract from the crop in any year a figure for wheat ground based on an average, one might obviously reduce or increase the resultant figure for carry-over by 10–20 millions of bushels. If, on the other hand, one were to apply to the remainder of the wheat crop, after subtraction of all other items from the total supply (the wheat thus statistically consigned to milling), an arbitrary or average factor of flour outturn per bushel of wheat, one would secure a figure for flour production notably above or below the actual outturn. The error in the one case raises or lowers the wheat item to be accounted for with other items of the disappearance; the error in the other instance makes a fictitiously high or low figure for flour consumption.

Since the war the number of bushels of wheat necessary to produce the unit of flour has apparently been rising. Before the war it was common to convert wheat into flour or flour into wheat on the assumption that 4.5 bushels of average wheat equalled the 196-pound barrel of flour. Since it is now possible to obtain the reported relation from the reports of the census, the use of the figure 4.5 for conversion is to be regarded as obsolete. The reported ratio was 4.63:1 in 1923–24 and 4.58:1 in 1924–25.

V. UNRELIABILITY OF CURRENT DATA ON CONSUMPTION

In the study of the disappearance of wheat, the immediate purpose lies in the elucidation of trade relations; the ultimate purpose lies in the appraisal of the human consumption of wheat and the relations of the wheat supply to this demand. While

the manufacture of flour is the chief item in the disappearance of wheat, the disappearance of wheat and the manufacture of flour are two fundamentally different phenomena. They are of considerable importance, and they can be understood only with the aid of adequate statistical material. The present section deals with the inadequacy of these data on consumption.

Wheat Disappearance

The available data on the disappearance of wheat cannot now be used to suggest an approximate estimate of the amount of wheat passing into human consumption, for the simple reason that our information on the several items is so indefinite that every year an amazingly large fraction of the reported supply remains unaccounted for.

The best illustration of this uncomfortable fact is to be found in the records of the United States Grain Corporation. The Food Administration, operating under war powers, was in possession of an extraordinary volume of information concerning wheat and flour. Flour mills, elevators, dealers, and bakers were under license. There was supervision of threshing and an accounting of screenings. Weekly reports were received from some 21,000 country elevators and 10,000 flour mills. Movements of wheat from farms to elevators and from elevators to mills, by states and regions, were reported continuously and minutely. Wheat was allocated to mills, competitive buying was suspended, and all operations were directly measured. The control of the Grain Corporation and of the Milling Division of the Food Administration covered approximately 97 per cent of the wheat supplies. The comparable information on wheat and flour thus secured was better than has been obtained in any decennial census. What under these circumstances could not be accomplished toward elucidating the disappearance of wheat, would appear to lie outside the range of present peace-time statistics. Outstanding, therefore, is the fact that in the three years covering the control of wheat by the Government (extending, however, one month beyond the date of operation of the Grain Corporation, but statistically included) a large volume of wheat remained unaccounted for in each year.

Table 1 indicates this clearly.

Table 1. — Disposition of Wheat, Crop Years 1917–18 to 1919–20, According to U. S. Grain Corporation*

(Million bushels)

	1917–18	1918–19	1919–20
Supplies			
Carryover in all elevators, mills, etc., beginning of year	40.3	14.3	37.9
Carryover on farms, beginning of year	15.6	8.1	19.3
Crop—government estimate	636.7	921.4	968.0
Imports of wheat	28.2	11.1	4.8
Total	720.8	954.9	1,030.0
Disposition			
Ground by mills	523.1	539.1	599.6
1 per cent loss in mill screenings	5.2	5.4	6.0
Exported as wheat	34.1	181.4	122.4
Used for seed	89.3	98.7	80.4
Fed on farms[a]	13.0	26.6	26.6
Farm reserves end of year	8.1	19.6	47.8
Stocks in all elevators and mills, end of year	14.3	37.9	76.0
Total	687.1	908.7	958.8
Unaccounted for	33.7	46.2	71.2

* Abbreviated from Table No. 21 of the supplement to "Grain and Flour Statistics During the War," published by the United States Grain Corporation in 1920. Corrected for the wheat crop of 1919.

[a] Department of Agriculture estimate based on average.

It is astonishing to note that during these three years we exported 338 million bushels of wheat as grain and lost account of 151 million bushels!

Table 2 represents, so far as the disposition of the stated supplies is concerned, Table 1 rewritten to correspond to the formulation now being used by the Division of Historical and Statistical Research of the Bureau of Agricultural Economics.

Obviously, the presence of definite figures for wheat ground as the largest item of known size in the one tabulation, and in the other the stating of wheat ground as the principal unknown, makes all the difference in the meaning and purposes of the two tabulations.

The unaccounted-for wheat in 1917–18 was 33.7 million bushels, or 4.6 per cent of the supply; in 1918–19 it was 46.2 million bushels, or 4.8 per cent of the supply; and in 1919–20 it was 75.2 million bushels, or 6.9 per cent of the supply. Noteworthy, first, is the large volume of wheat involved; secondly, the regular increase in the figure, suggesting possibly the cumulation of a statistical error. When such a volume of wheat remained unaccounted for during years in which the wheat ground was specifically reported and wheat flour was almost as precious as munitions, it would appear fatuous in normal times to make estimates of carryover in and out and wheat used for seed and fed to animals, to subtract the sum of these from the wheat crop, and to regard the remainder as wheat passing into human consumption.

TABLE 2. — DISPOSITION OF WHEAT, CROP YEARS 1917–18 TO 1919–20 (U. S. GRAIN CORPORATION), ACCORDING TO THE CLASSIFICATION OF THE U. S. DEPARTMENT OF AGRICULTURE

(Million bushels)

	1917–18	1918–19	1919–20
Supplies	720.7	954.9	1,030.0
Disposition			
Exports (including flour)	132.6	290.2	219.9
Seed requirements	89.3	98.7	80.4
Farm reserves	8.1	19.6	47.8
Other stocks, including flour	14.3	37.9	76.0
Total disposition	244.3	446.4	424.1
Disappearance for food and feed	476.4	508.5	605.9

The detailed figures of the Grain Corporation give no trustworthy clue to the explanation for these noteworthy discrepancies. Whether the crops were overestimated or the items of stocks and wheat fed to animals underestimated, or both, remains conjectural. Pearl estimated the wheat fed to animals and wasted as 7 per cent of the crop, far below the figure of the Department of Agriculture for feed alone, but larger than the figure stated in the table for the war years. An inherently probable explanation of a part of the unaccounted-for disappearance may lie in the suggestion that farmers, disregarding the urgent appeals of the Department of Agriculture and the Food Administration to send to market all millable wheat, actually used more wheat as animal feed during those years than they were supposed to do.

The average for the three years of wheat lost in mill screenings, fed on farms, and unaccounted for was 78 million bushels, which was a little over 14 per cent of the average amount ground in mills. If one takes the flour production figures of Russell, minus net exports of flour, and the figures of the United States Department of Agriculture for wheat disappearance (as including food, animal feed, and waste) and by subtraction secures figures for animal feed and waste, the average of these figures over the ten-year period is 13 per cent of the average flour production of that period. This concordance looks too good to be more than accidental; but it does indicate that a fraction of unaccounted-for wheat must be regularly present in the estimates of the disposition of the wheat supply.

WHEAT FED TO LIVESTOCK

Wheat fed to livestock and wheat fed on farms are commonly used as synonymous expressions. This is an error that in different years may run into several million bushels.

The late Secretary of Agriculture, in his report of November 1923 on "The Wheat Situation" (Table 19), used certain figures for wheat "fed to livestock." Since this table was based on "reports from farmers," "fed to livestock" obviously meant "fed to livestock on farms," and presumably on farms in counties where the wheat was grown.

Wheat fed to animals is not identical with wheat fed on farms, the former being larger. Wheat fed on farms in the locality where it is grown consists of three kinds of wheat:

(1) Tail wheat; and frosted, shrunken, bin-burnt, sprouted, smutty, or other forms of deteriorated wheat, salable only at heavy discount and unfit for seed.

(2) Low grades or undesirable varieties of millable wheat, selling at a discount so heavy as to make the feed value on the farm higher than the cash value converted

into other available feeding stuffs at local prices.

(3) Sound representative wheat, in some years and in some regions, under conditions of unusual scarcity of other feeding stuffs.[1]

Wheat of the first two kinds is included in the crop report but is not marketed; to the extent that it is not included in the estimate of wheat fed on farms, it is lost in the item of wheat unaccounted for.

When wheat is shipped to elevators and mills, it contains a variable percentage of dockage. This wheat ought to be cleaned on the farm, or at least in the country elevators; but for the most part it is not cleaned until it reaches the mills. The screenings are for the most part later used as animal feed, either unground or ground in the form of mixed feeds. To a considerable extent these feeds are shipped back to the regions from which they were originally derived. The process constitutes a wastage of transportation that has been made prominent in the prairie provinces of Canada, where records are kept of the losses in cleaning and of rail shipments of screenings. The loss in cleaning of Canadian hard spring wheat in four of the past five years has been estimated at 3 per cent of the crop.[2] The Minnesota State Grain Inspection Department has kept records of dockage assessed on wheat at Minnesota markets since 1899. In recent years the dockage has amounted to from 2.3 to 4.8 per cent.[3] We have no comparable estimates for the wheats of other regions, but it is known that the conditions in the spring wheat belt are the worst, though in some years much of the hard winter wheat is quite foul. Assuming for the sake of argument that the dockage removed from wheat by mills grinding soft red winter, hard winter, and the various Pacific Coast wheats was half as much as is the case with Canadian hard spring wheat, we may calculate that the total materials removed before grinding might correspond to some 15 million bushels. Since this is practically all fed back to animals, some such figure must be added to the government estimate of wheat fed on farms in order to secure a more comprehensive estimate of "wheat" (included in the crop estimate but by no means all true wheat) fed to livestock.

The official data on wheat fed to livestock are substantially limited to those obtained in November 1923 from estimates of crop reporters of the "usual disposition" and the intended disposition of the 1923 crop. The "usual" figure averaged 8.1 per cent of the crop, and ranged in different states from 1 per cent in North Dakota to 24 per cent in New York. The corresponding figure for intended disposition of the 1923 crop was much higher,—11.6 per cent. In presenting these figures the Department of Agriculture added:[4]

> Because of unsatisfactory wheat price situation at time of inquiry the estimates of "fed to livestock" may be slightly excessive. The ratio of 1923 to usual, however, is felt to reflect the changed situation as it existed in November. The degree to which these expressed intentions materialized was probably affected by subsequent price changes.

Pearl,[5] statistician of the Food Administration, estimated that 5 per cent of the wheat crop was wasted and lost and only 2 per cent fed to animals directly on the farm. His figure for wastage and losses does not seem too high, in view of the wheat remaining unaccounted for under the operations of the Grain Corporation during the war, if one accepts the crop estimate; but his figure for wheat fed to animals is certainly too low. Wheat fed to livestock and wheat losses between the harvest and the arrival of the grain at the mills were the subject of debate in every European country during the war; the estimates ranged from as low as 2 per cent in countries like Italy to as high as 10 per cent in countries like Germany.

Using the Department of Agriculture average of 8.1 per cent of the crop, we reach the quantities fed to livestock in the past 11 years as shown below. To these figures one ought to add a more or less constant fraction representing screenings

[1] In the years 1921–24, efforts were made by the federal and state departments of agriculture to instruct farmers in the relative feed value of wheat in terms of calories and price.

[2] Canada, *Monthly Bulletin of Agricultural Statistics*, April 1925, p. 101.

[3] *Agriculture Yearbook, 1923*, p. 619.

[4] *Ibid.*, p. 660.

[5] *The Nation's Food*, 1920, pp. 212–218.

included in the crop that are not milled into flour, but are returned to animal feed for urban and country use; this has not here been done.

An indirect way of checking these figures is to take the government figure for disappearance for food and feed and subtract from this a figure for wheat used in milling domestic flour supplies, and regard the remainder as wheat fed to livestock and wasted. The two sets of figures compare as follows:[1]

(Million bushels)

	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20	1920–21	1921–22	1922–23	1923–24	1924–25
Calculated with official average (8.1 per cent):	72	83	52	52	75	78	68	66	70	65	71
Calculated by indirect method:	67	110	33	47	77	112	36	–19	28	76	40

The figures do not agree well nor could they be expected to do so, since in both calculations a number of plus and minus errors find expression. The wheat concerned is not in itself important, and the variation has little consequence so long as there is a notable amount of the reported crop otherwise unaccounted for. But it becomes important for its influence on the carryover at the end of the crop year and on the disposition of wheat during the final months of the crop year. If the figure for wheat fed to animals, including all fractions, may vary as much as to be expressed in a plus or minus error of 15 million bushels, this figure subtracted from or added to farm reserves as reported on July 1, would in many years make a substantial difference that would find reflection in the expected final distribution of the crop, on which the prices of the May and July options are to some extent based. Early improvement in this estimate is hardly to be expected, except for the eventual inclusion of the screenings of wheat flour mills.

Per Capita Flour Consumption

We have no intention of entering here into an exhaustive survey of the per capita flour consumption. It is, however, advantageous in a brief manner tentatively to appraise the apparent consumption of flour in the light of the methods that are available for measuring flour production.

According to Pearl, the average per capita consumption of wheat flour and wheaten products in the seven fiscal years 1911–18 was about 205 pounds, corresponding to 1.04+ barrels of flour.[2] There were necessarily a number of hurried guesses of the United States Department of Agriculture included in the computations, and the period included two abnormal years.

It is sometimes inferred that consumption of wheat is notably elastic and directly related to prosperity and the condition of the family income. In good times some classes cut down consumption of wheat and turn to other foods, especially meats; poorer classes increase the use of wheat and reduce the consumption of cheaper cereals. In periods of unemployment or lower wages, these practices are reversed. Obviously, it might be possible for these to be compensatory, although the lower-wage class contains a larger number of consumers than the higher-wage class. This might mean that increased use of wheat flour by certain classes in times of prosperity would outweigh decreased use of flour in other classes. This, however, is contrary to the usual trade notion existing in milling circles, which runs to the effect that hard times increase the consumption of flour.

It seems to be believed in some quarters that consumption of wheat follows the trend of the business cycle. This is obviously a contradiction of the view that hard times increase the consumption of wheat. It might, however, still be true that the consumption of wheat follows the business cycle, if there were large waste in the periods of boom and small waste in the periods of depression.

Lastly, there is evidence for the view[3] that in a country like ours, consumption (or at least disappearance) of wheat rises with large crops and declines with smaller crops. These more or less conflicting views are appraisable only with possession of accurate data on flour production.

[1] See Appendix Tables I, III.
[2] *The Nation's Food*, 1920, pp. 212–218.
[3] See Wheat Studies, July 1925, I, No. 7.

In order to form a tentative idea of the per capita flour production of the mills of the United States, we may contrast estimates drawn from trade data with those based on reports of the government. Excluding the calendar years 1917 and 1918, Russell's figures for flour production for the years 1914–24, inclusive, are adjusted for exports, averaged, and divided by the population to secure per capita figures. We have census reports for the years 1914, 1919, 1921, 1923, and 1924, the latter being the monthly grindings adjusted to the census of 1923. These various census figures are not strictly comparable, as we have already shown above (p. 305), and each is more or less below the truth. There is little purpose in attempting a highly elaborate adjustment to include the outturn of mills not reporting to the Census Bureau, so long as we have no good figures for carryover of flour, since variations in the flour carryover may easily be larger than flour production missed in the census reports. With a year's further experience with the monthly census of flour milling and the possession of the forthcoming biennial census of 1925, we should be in a position to make a more accurate adjustment than is possible today.

Table 3 shows the figures for per capita consumption obtained by using Russell's figures and the census figures for flour production, less net exports of flour. These are contrasted with those obtainable by taking the United States Department of Agriculture figures for disappearance, subtracting each year the figure for the average for wheat fed on farms (8.1 per cent), and converting the figure for wheat into flour by the factor 4.5. These give hypothetical figures (only to be used with the reservations expressed below Table V in the Appendix).

It is clear from the variations in these figures, taken in the light of the several plus and minus errors that find expression therein, that such figures cannot be employed by students of nutrition, or by the trade, to judge flour consumption in the country, in a region, in a year, or through a business cycle. Moreover, the figure for per capita production cannot be accepted as the figure for per capita consumption, since carryovers of flour are by no means constant. Nor are any of the current theories of the elasticity of the demand for flour, and the reactions of variations in family income on the use of flour, appraisable with the use of the figures currently available.

TABLE 3.—CALCULATIONS OF PER CAPITA FLOUR SUPPLY, DISREGARDING CARRYOVERS*

(Barrels)

Calendar year	Russell	Census[a]	Fiscal year	Russell	U.S.D.A.
1914	1.06	1.12	1914–15	0.97	0.96
1915	1.00		1915–16	1.07	1.13
1916	1.05		1916–17	1.02	0.98
1917	1.02		1917–18	0.91	0.90
1918	0.89		1918–19	0.93	0.94
1919	1.02	1.02	1919–20	1.02	1.09
1920	0.95		1920–21	0.86	0.79
1921	0.98	0.88	1921–22	0.99	0.82
1922	1.09		1922–23	1.05	0.96
1923	0.99	0.88	1923–24[b]	1.01	1.04
1924	1.04	0.94	1924–25[c]	1.01	0.95

* Basic data given in Appendix Tables.

[a] As reported on various bases, most inclusively by the 1919 census, least inclusively by the monthly census for 1924, 1923–24, and 1924–25. See above, p. 305.

[b] Census figure, 0.96; *Northwestern Miller* figure, 1.01.

[c] Census figure, 0.92; *Northwestern Miller* figure, 1.03.

In the *Agriculture Yearbook* for 1923, page 110, a discussion on "The Decreased Consumption of Wheat" is introduced with the following words:

> Decrease in consumption of wheat flour in this country has contributed to the large exports of the war and post-war period. The war appeal to save bread, aided by high prices, formed food habits which have remained with us.

This is followed by a reference to the pre-war custom of serving bread free in public eating-places contrasted with the post-war custom of making a charge for bread.

It is difficult to find in the statistical material of the Department of Agriculture an adequate basis for the inference that consumption of wheat flour in this country has decreased materially. On page 614 of the same *Yearbook* is a tabulation of per capita disappearance of wheat in the United States. It is an arbitrary inference to assume that the stated decline in per capita disappearance of wheat means a corresponding or substantial decline in per capita consumption of flour. Not only are the plus and minus errors of the several items of supply and demand finally cumulated in

the figure for per capita disappearance of wheat, but no consideration is given to variations in wheat fed to animals, wasted, and unaccounted for, and to changes in the level of extraction. The only sound statistical method of proving a decrease in consumption of wheat flour must rest upon milling statistics, and these were not used in the formulation of the sentence quoted above for the simple reason that they were not available.

It is more or less widely believed that as the result of the war (entirely apart from the question of free bread service in public eating-places) people are ingesting less wheaten products—that having learned to get along with less bread and cake, we have continued to do so. To us this sounds naive. More bread eaten free with one meal taken in a public eating-place might mean less bread eaten with the two meals in the home; a breadless meal in a public eating-place might mean more bread eaten with the two meals at home. We do not contend, and could not prove, that the per capita ingestion of wheaten products is not less than it was before the war; we merely insist that the proponents of lower consumption are not in statistical position to prove it, or, if proved, to measure it. But if such an under-consumption exists, explanation should be sought in the price relations of wheaten foods and other foodstuffs, in the expansion in use of fresh fruits and vegetables, and in the purchasing power of the family income.

How little the trade knows about flour disappearance may be illustrated by two examples.

According to the biennial census of 1923, the total sales of wheat flour to commercial bakeries were a little under 35 million barrels. This figure created veritable consternation in milling and baking circles, because it was so much lower, probably 10 million barrels lower, than the figure commonly accepted for such flour sales.

The second example is drawn from the milling records of the past season. In January it was apparently the consensus of opinion in milling and baking circles that flour stocks in distributive channels were at low ebb and that buying was strictly from hand to mouth. On these two positions, with a further assumption as to prospective exports, it was inferred that flour milling during the remainder of the fiscal year would not exhibit the usual seasonal decline, but instead would continue on a relatively high level. The census figures for grindings during the last five months of the fiscal year exhibit, however, a seasonal decline that could only be described as a heavy decline from the level of milling operations during the first seven months of the fiscal year, a reduction that could not be explained by decline in exports.[1] Either the term "hand-to-mouth buying" is in itself relative and varies from season to season; or flour stocks were in existence of which the trade had no knowledge or took no cognizance.

VI. FORECASTS OF WHEAT DISAPPEARANCE, MARCH–JUNE

A prominent use, and the principal abuse, of the current data on disappearance of wheat and production of flour lie in their employment in March in trade forecasts of probable developments up to the new crop. The lack of estimates of farm reserves, stocks in country mills and elevators, stocks in city-mill hands, and flour stocks in the distributive trades on December 1 accentuates the difficulties of the trade as March approaches, since up to the establishment of the monthly milling census there was nothing to guide the trade outside of inspections, receipts, and the visible wheat. By March 1, therefore, except where the market was clearly a buyer's market, considerable uncertainty naturally developed. The issue of the March 1 estimates for wheat on farms and in country mills and elevators, with the visible wheat, thereupon made possible a speculative prevision extending to July 1. To a considerable extent, during this period, the relations of the May and July options have rested on the figures

[1] See below, p. 316.

issued on March 1 and the forecasts based upon them.

The Principal Questions

The American millers, the exporters, and the European importers ask four questions in March:

(1) What is the available American wheat supply for the remaining four months of the year?

(2) What are the requirements of American mills during this period?

(3) What is the exportable American surplus?

(4) What is to be the American carryover on July 1?

The amount of wheat which will be used for spring seed can be forecast in March with reasonable accuracy. Wheat fed to animals during the months March–June has been generally disregarded, on the theory that feed use of wheat would have been completed earlier in the winter. Given the disposition of the supply on the basis of the revised crop report of December, and the remnants reported on March 1 in farm reserves, in country mills and elevators, and in the commercial visible, the trade attempts each year to answer the four questions above stated. In the absence of milling statistics, the practical result has been, in effect, to load the uncertainties upon the item of domestic consumption.

In a year of easy adjustment between world supply and world demand, the situation is of no great practical importance. But in a year of presumably close adjustment between world demand and world supply, as during the past season, this statistical situation in the wheat supply and disposition of the crop during March–June becomes acute. The situation in respect to supply and disposition of wheat in the United States during the period under review was this year esteemed so important as to be reflected in the grain exchanges of the world and in the domestic markets of most European countries.

This method of loading on mill consumption the uncertainties of the other items is bad enough when applied to a crop year, but leads to worse results when used to estimate the consumption in the last four months of the crop year—namely, from March 1 to July 1. The census data on mill grindings and mill stocks put us in a position to place a check on the other items in disposition of wheat supply.

Broomhall's Formulation

Table 4 represents Broomhall's forecast, early in March 1925, of possible wheat happenings in the United States up to the first of July, as based on the available trade estimates of stocks as of March 1.

Table 4.—Broomhall's Summary and Forecast of United States Wheat Supplies and Their Disposition, March 5, 1925*

(Million bushels)

	1920	1921	1922	1923	1924	1925
Farm reserves, March 1st	166	208	131	153	134	115
"Bradstreet's," American only	59	32	47	55	73	75
Country mills and elevators	118	82	75	93	90	95
Total available March 1st	343	322	253	301	297	285
Farm reserves, June 30th	49	57	32	36	31	
"Bradstreet's," American only	28	12	20	29	39	
Country mills and elevators	36	26	28	36	36	
Total available June 30th	113	95	80	101	106	60
Indicated quantity consumed, seeded and exported, March–June	230	227	173	200	191	225
Of which exported	78	109	54	48	36	63
Of which seeded	30	30	30	30	30	30
Of which consumed	122	88	89	122	125	132
Add imports of Canadian wheat	2	11	7	17	8	
Total consumed	124	99	96	139	133	132

* Broomhall's *Corn Trade News* (daily edition), March 5, 1925, p. 639.

Under "total consumed" of course is understood something more than mill consumption. But even if we possessed no figures for milling, one could hardly believe that mill consumption in the period March–

June during the past six seasons could have been portrayed by these figures.

Broomhall's table, even for earlier years, does not check at all points with the best reported figures. With suitable corrections, his table would appear as in Table 5.

TABLE 5.—UNITED STATES WHEAT SUPPLIES AND THEIR DISPOSITION, TABULATED IN THE SAME FORM AS BROOMHALL'S TABLE, BUT BASED ON OFFICIAL UNITED STATES FIGURES

(Million bushels)

	1920	1921	1922	1923	1924	1925
Farm reserves, March 1st	169.9	217.0	134.3	156.1	137.7	113.9
"Bradstreet's" U. S. visible	58.6	31.9	48.0	54.6	72.9	76.4
Country mills and elevators	123.2	87.1	75.1	102.9	98.3	69.1
Total available March 1st	351.7	336.0	257.4	313.6	308.9	259.4
Farm reserves, July 1st	49.5	56.7	32.4	35.9	30.7	30.0
"Bradstreet's" U. S. visible	23.4	10.0	20.3	29.4	38.6	32.0
Country mills and elevators	37.3	27.2	28.8	37.1	37.0	25.0
Total available June 30th	110.2	93.9	81.5	102.4	106.3	87.0
Indicated quantity consumed, seeded, and exported, March–June	241.5	242.1	175.9	211.2	202.6	172.0
Of which exported	78.2	109.4	57.3	48.2	35.3	52.0
Of which seeded	29.1	28.0	27.6	27.7	24.6	30.0
Of which consumed	134.2	104.7	91.0	135.3	142.7	90.0
Add imports of Canadian wheat	1.5	10.8	7.1	4.6	7.2	1.0
Total consumed	135.7	115.5	98.1	139.9	149.9	91.0

COMPARISONS WITH MILL GRINDINGS

Let us now contrast the best available figures for wheat ground with the figures for consumption secured by the current method employed by Broomhall. Russell's figures for flour produced have been converted into wheat by multiplication with 4.5. The figures of the Bureau of the Census for the last two years are adjusted for the proportion of mills reporting to the total reported in the previous biennial census.

Table 6 shows clearly that the discrepancies are heavy and erratic. But this is exactly what is to be expected when we recall that this figure for consumption is affected by cumulative net errors of the previous crop report and carryover and the March 1 estimates of farm reserves, stocks in country mills and elevators, the visible wheat, and invisible stocks of various kinds. Broomhall's method of computation appears to assume either that all the wheat in the country, and no more, is included in the item for "total available, 1st March," or that missing items may safely be left out of account. As a matter of fact, one positive item has always been missing—namely, wheat reserves in mill hands (not reported under farm reserves, stocks in country mills and elevators, and the visible supply), reserves that are variable and are likely to be large on March 1. Lacking also in the item, "total available, 30th June," are the corresponding mill reserves of that date. Beyond this, any overestimate of the previous crop year or the previous carryover would find expression in the item "total

TABLE 6.—COMPARATIVE APPROXIMATIONS OF WHEAT CONSUMED IN THE UNITED STATES, MARCH–JUNE, 1920–25*

(Million bushels)

	1920	1921	1922	1923	1924	1925
Broomhall						
Total consumed	124	99	96	139	133	132[a]
Corrected						
Total consumed	136	116	98	140	150	91[b]
Russell						
Wheat milled	143	157	152	166	176	155[b]
Census						
Wheat milled, unadjusted					142[b]	128[b]
" " adjusted					174	148

* Based on Tables 4 and 5, *Russell's Commercial Review*, and Monthly Census of Wheat Milling.

[a] Forecast.

[b] Reported.

available, 1st March." The mill grindings for the period March–June are obviously the direct method of applying a check, and when applied, the result is disastrous to our confidence in the method employed by Broomhall, even conceding that the flour production estimates of Russell are trade figures and that we have the figures of the Bureau of the Census covering only two years.

The Element of Mill Stocks

On January 31 the mills making replies to a questionnaire of the Millers' National Federation reported stocks of some 74 million bushels of wheat and 3 million barrels of flour. These reporting mills manufactured in 1923 about 70 million barrels of flour, being about 57 per cent of the total. If we assume, which is probably in excess of the truth, that the unreporting mills carried the same relative stocks, this would have meant that total mill stocks on February 1 were in the neighborhood of 150 million bushels, including flour as wheat. The unreporting mills probably carried relatively lower stocks than the reporting mills, but how much less is not determinable; therefore, no one is in a position to suggest how much the figures for stocks would have been above 74 million bushels of wheat and 3 million barrels of flour if all the merchant mills whose annual outturn is in excess of $5,000 could be included in the report. The mill stocks a month later were probably somewhat smaller than on February 1, but again how much is indeterminable. For purposes of argument, let us assume that the mill stocks on March 1 were the same as on February 1. On March 1 the Department of Agriculture issued estimates of wheat on farms and in country mills and elevators. Table 7 shows an approximation to the wheat supplies on March 1, 1925, including country stocks, Bradstreet's figure for the American visible supply, and the unadjusted minimum estimate of mill stocks.

Part of the mill stocks was in country mills and elevators, part of it in the visible supply,[1] but how much in each case is indeterminate. Clearly, however, there was in the country more than the 259 million bushels comprising the sum of the first three items; but how much more than that, how much less than 346 or possibly more than that, no one can guess. The figure of 346 million bushels for supply on March 1 would have given a very different complexion to the Broomhall table from the 285 in the original table or the 259 in the corrected table.

Table 7.—Wheat Supply on March 1, 1925

(Million bushels)

Farm reserves	114
Country mills and elevators	69
Bradstreet's American visible	76
Millers' National Federation report of mill stocks	87
Total	346

This is illustrated in Table 8, which contains the figures for supply available on March 1, contrasted with the figure for the amount of wheat that must have been in the country according to the reported exports of wheat, wheat ground, and carryover on July 1.

Table 8.—Comparative Estimates of Wheat Stocks, March 1, 1925

(Million bushels)

Sum of farm reserves, in country mills and elevators, and commercial visible, March 1		259
The above, plus city-mill stocks according to Table 7, March 1		346
Sum of:		
Farm reserves, July 1	30	
Country mills and elevators, July 1	25	
Commercial visible, July 1	32	
Mill stocks, Bureau of the Census, July 1	48	
Exports as wheat, March–June	34	
Wheat milled, Bureau of the Census, March–June	148	
		317

This table shows that it is unwarranted on March 1 to make a forecast for the last four months of the fiscal year on the basis of estimates of wheat on farms, in country mills and elevators, and the commercial visible, without estimates of wheat grindings and city-mill stocks.

[1] Of the 76 million bushels only 18 were reported as hedged. Practically all visible wheat east of the Rocky Mountains is hedged, while large mills carry stocks that are mostly hedged, but are not in the visible.

VII. SEASONAL VARIATIONS IN FLOUR OUTPUT AND EXPORT

Seasonal Influences

The monthly curve of flour milling is affected by at least four influences. (1) Midsummer stocks of flour in the channels of distribution are usually low for climatic reasons and because of the disinclination of the trade to hold heavy stocks in the face of a new crop. (2) In the autumn, flour holders stock up and the mills speed up to meet their demands as well as to make the best use of new crop supplies. (3) The export demand varies greatly, and reacts upon milling activity. There is a certain degree of normal seasonal variation of exports, dependent also on climate and on the relations of our flour supplies to the flour supplies of other competing countries. (4) Finally, the actual and prospective course of wheat prices constitutes a modifying factor.

These influences vary from year to year. In some years mill operations and stocks decline in midsummer more than in others. In different years, fall milling is restrained or exaggerated; dealers stock up heavily and stay so or do not stock up and buy from hand to mouth through the season. In some years, export demand is early, sustained, and used to maintain stocks abroad; in other years it is low or may be reversed as to seasons. The peaks of milling may be high and narrow or low and broad. We have no long-term figures from which to construct an average or norm with which to contrast the variations in a single year. Nevertheless, it is of interest to examine the available data on flour milling and exports from the standpoint of seasonal variation.

Available Milling Statistics

Until recently the best figures available for milling outturn by months were those based on the experiences of the Grain Corporation and the Milling Division of the United States Food Administration. This series was extended backward to January 1914, in a somewhat arbitrary manner, with the Food Administration data for the years 1917–19. A. L. Russell, formerly statistician of the U. S. Grain Corporation, has carried the series forward from July 1, 1920, using the data of the *Northwestern Miller*, and again with the aid of somewhat arbitrary assumptions. The whole series, referred to as Russell's, is given in Appendix Table VII, from July 1914 to June 1925; and Appendix Table VIII shows the monthly and quarterly figures for the past five years expressed as percentages of the annual totals.

These data show that the flour trade year coincides with the wheat crop year and the fiscal year, all running from July 1 to June 30. June is always a low month in flour production, and the outturn for July, with the advent of new crop wheat, usually registers a sharp increase over that of June. Dividing the year into quarters, beginning with July, one observes that throughout the period covered by the tables the outturn for the second quarter was always larger than for the first quarter, except in 1921–22, in which year the mills endeavored by producing heavily in the first quarter to take advantage of current price relations. Only twice during the period was the outturn of the third quarter equal to that of the first or second quarter—namely, in 1915–16 and 1917–18, both times due to exigencies of war. The last quarter is ordinarily the one of lowest production. Only four times during the period (in 1916–17, 1917–18, 1918–19, and 1920–21) did the outturn for the last quarter exceed that of one of the other quarters of the year; in all instances this was due to exigencies of war demand and post-war trade.

Quarterly averages for various periods, expressed as percentages of the year's total, run as follows:

	July–Sept.	Oct.–Dec.	Jan.–Mar.	Apr.–June
10-year average, 1920–24	25.36	30.13	23.77	20.74
The same, excluding 1917–18	26.29	28.96	23.66	21.09
3-year average, 1914–17	25.71	30.03	23.49	20.77
4-year average, 1920–24	27.38	27.52	23.64	21.46

None of these averages is really representative, but the last is probably least unrepre-

sentative, since it excludes the war period and the immediate post-war period. All the averages agree in showing the production of the first half of the trade year about 55 per cent of the year's total.

Since July 1923, as we have already noted, the monthly milling census has yielded data which, though incomplete, afford the basis for estimating flour production with a serviceable approach to accuracy. Each month the Census Bureau reports thirteen months' data for wheat ground and flour produced by all reporting mills (usually 1,000 to 1,100), and also similar data for a smaller number of identical mills (usually about 950) which have reported for the entire thirteen months. A figure is also given showing the ratio of the production of these identical mills to the total flour production reported according to the available data from the most recent biennial census. These figures are summarized in Appendix Table VI.

It is necessary to point out that in the census estimate of flour production in 1923–24 the 955 regularly reporting mills produced approximately 82 per cent of the flour reported in the biennial census of 1921, while in the estimate for the year 1924–25 the 949 regularly reporting mills produced approximately 87 per cent of the flour reported in the biennial census of 1923. But the bases of the two biennial censuses were not identical; and the results, therefore, are not closely comparable. The number of establishments reporting in 1923 was lower than in 1921, due particularly to the fact that only strictly merchant mills were included in the census of 1923, while in 1921 mills doing customs grindings as well as merchant business were included if the value of the outturn exceeded the minimal limit of $5,000 per annum. This has the effect of making the figure for 1924–25 appear low by comparison with the figure for 1923–24, and the adjustment secured by the use of the factor 87 per cent in the latter year yields clearly too low an absolute figure, compared with that secured for the earlier year through adjustment with the factor 82 per cent. According to the *Northwestern Miller*[1] the estimate of approximately 113.5 million bushels in the 1923 biennial census ought to be raised to 120 millions to correspond with total production. This is a temporary difficulty in the monthly census of flour milling that will be rectified with another year's experience with the procedure.

[1] February 18, 1925.

Monthly Indexes of Seasonal Variation

The Federal Reserve Board computed a seasonal index for flour production in making their index of production in basic industries (see *Federal Reserve Bulletin,* December 1922, pp. 1414–21). This seasonal was computed from Russell's figures for monthly production of flour for the years 1914 to 1921 inclusive, by obtaining the ratios of the original data to a 12-month moving average, then taking the median of these ratios for each month and adjusting these medians to total 1,200 for the year.

The Harvard Economic Service also computed a seasonal index of flour production in making their index of the volume of manufacture (see *Review of Economic Statistics,* January 1923, pp. 49–50). Russell's figures for the period January 1914 to October 1922 were used and the seasonal index was computed by the regular "link relative" method as described in the *Review of Economic Statistics,* Preliminary Volume I.

These two seasonal indexes are compared below:

Month	Federal Reserve Board	Harvard Economic Service
January	112	110
February	89	90
March	89	91
April	82	86
May	84	82
June	79	80
July	77	86
August	106	105
September	113	117
October	124	125
November	124	121
December	121	108

The two indexes agree in showing distinctly heavier millings in the months of August–January than in the months of February–July, but the two methods give quite different curves, and notably different results for July and December.

A more serious criticism applies to both indexes. The length of the series employed is spurious. Since the basic data for the period 1914–17 were arbitrarily computed backward from the data of the United States Food Administration for the years 1917–19, it is technically improper to use the results of these earlier years in combination with those of the later years to form an index covering the entire period. The figures prior to July 1, 1920, are not adapted to the preparation of a seasonal index of flour milling, for the simple reason that the variations between 1914 and 1920 did not express reactions to normal trade influences but were largely the results of arbitrary factors. Prior to our entrance into the war, more or less concerted European buying introduced abnormal influences into our grain and flour trade. After the entrance of the United States into the war, wheat supplies were allocated to mills, and flour milling was forced, since it was the policy of the Food Administration to ship flour instead of wheat to the largest extent possible. Early in 1919 milling operations were released from government control, but the operations remained abnormal because the United States government was shipping abroad large amounts of flour as food relief; European countries continued to control imports through government agencies; the Director of the United States Grain Corporation bought wheat and flour in maintenance of the fixed price; and large amounts of clear flours were literally dumped on the Corporation by the mills. Beginning with July 1, 1920, wheat grindings again became private operations; and from that time on the volume of grindings has represented reactions to trade influences, still more or less abnormal in importing European markets. From this date alone determinations of volume and seasonal variations should be undertaken. Nor is it safe to construct such an index from the five years' post-war observations at our disposal, for the period is much too short to yield a reliable index of normal seasonal variation.

The Federal Reserve Board and the Harvard Economic Service are of course fully aware of the tentative character of their indexes, and they have never employed them in forecasts. To use either index, or another constructed from the data of the past five years, as an aid in forecasting flour production for a few months ahead, might lead to quite erroneous results. Probably such a seasonal index can be computed with safety only after the lapse of several years.

Application to Forecast February–June Millings

There remains a question whether it may be possible to use the available data in forecasting the probable flour output, not of a single month or series of months, but of a period of months toward the end of the crop year. In particular can one employ the data for flour output in the first seven months to predict the output in the five months February–June? If it were possible in March, when the census figures for the first seven months are available, to indicate the normal totals for the year, and by deduction the flour output for the last five months, it might be possible to derive a forecast by modifying the resulting figures up or down in the light of the best available information concerning the outlook.

The annual totals, according to Russell, are shown in Appendix Table IX, divided into 7-month and 5-month portions. For the four years 1920–21 to 1923–24, the flour output of the first seven months averaged 63 per cent of the output for the trade year. If now we take the census figures for production July–January in the past two years, adjust them to allow for non-reporting mills, and raise the resulting figures to 100 per cent by the use of the average ratio derived as above, we have the results shown in Table 9. These are compared with the actual outturn as derived from the final reports of the census (adjusted for non-reporting mills) and as reported by Russell and the *Northwestern Miller*. It appears that the crude forecast was about 4 million barrels too low in 1923–24 and about 4 million barrels too high in 1924–25.

In comparing the differences between the forecast and the census reported total, on the one hand, with the reported totals of Russell and the *Northwestern Miller*, on the

other hand, it must be recalled that Russell and the *Northwestern Miller* attempt to include unreported flour milling, while the census figures here included are not adjusted to include any custom milling or milling in merchant mills with an outturn of less than $5,000 per annum. If the flour trade of the country had really been on a hand-to-mouth basis on the first of February, as was believed by most traders, and production had continued through the year on an even level, the census production would have recorded an outturn of 132 million barrels instead of the 121.7 actually reported.

TABLE 9.—FORECAST OF YEAR'S PRODUCTION OF FLOUR, 1923–24 AND 1924–25, FROM DATA FOR FIRST SEVEN MONTHS, COMPARED WITH REPORTED PRODUCTION

(Million barrels)

	1923–24	1924–25
Census grindings, July–January for identical mills, as reported in March	63.5	66.7
Adjusted for non-reporting mills	75.6	76.7
Raised from 63[a] to 100 per cent	120.0	121.7
Final census report, adjusted for non-reporting mills	123.9	117.7
Russell's reported total	129.8	128.5
Northwestern Miller estimate	129.4	129.6

[a] Average percentage of annual production milled in first seven months of years 1920–21 to 1923–24, according to Russell.

The crude results shown are not without significance. Some variations from year to year are to be expected, and it is part of the forecasting operation not merely to make such a calculation as the above, but to take account of influences which promise to cause actual production to be higher or lower than the average. Better results can be expected when census figures for grindings are available for a longer period, and when the average percentage of the year's output produced in the first seven months can be based on a longer period.

IRREGULARITY OF FLOUR EXPORTS

One special reason for the difficulty in forecasting the flour production of the last four or five months of the fiscal year—or indeed of any period—lies in the irregularity of exports. This is suggested by Appendix Table X, which gives the monthly flour exports of the United States in the last six fiscal years. A flour exporter would probably rate each of these years as abnormal, for one reason or another. The high months in each of the different years were respectively July, August, October, November, December, and May; the low months were respectively July, September, January, June, and May. It is difficult to picture the variations in these figures as corresponding to seasonal influences in the importing countries. When one scrutinizes the individual items in this short series, a curve of flour exports based on the relations of percentage of export each month to the total would not seem to afford a convincing basis for a forecast of exports. The exports of a certain month were milled, for the most part, one to three months previously; some exports represent fulfillment of contracts undertaken much earlier and milled in accordance with the otherwise varying business of the mill; part of the export represents a dumping trade of low-grade flours that may have accumulated over a considerable period of time.

A comparison of the rate of flour export from the United States with that of the corresponding export from Canada is suggestive. The individual items in the table of Canadian flour export (see Appendix Table XI) exhibit less fluctuation than is to be observed in the figures of exports from the United States. Taking the course of the monthly averages over the past six years for what it is worth, in the case of the United States there are two high points in exports—namely, October–November and in March. These same two high points are visible in the Canadian exports, except that the first high point is deferred a month—namely, November–December, but the second high point is the same month, March. The exports in January and February are, for the United States, lower than in July and August and almost as low as May and June. For Canada, however, the exports for January and February do not fall to as low a relative level. The tables are not strictly comparable, since the Canadian crop year is really September–August, while our crop year is July–June, and we are exporting new-crop

flour in August and September at a time when the Canadians are still exporting old-crop flour. Since the export of flour from Canada is practically 60 per cent of the production, while that from the United States is less than 15 per cent of the production, the relationship between flour export and wheat grindings is naturally much closer in Canada than in the United States, and the difficulty of forecasting flour production for months ahead is correspondingly greater in Canada.

VIII. CONCLUSIONS

The outcome of such an appraisal as the foregoing is necessarily unsatisfactory in the direction of positive interpretations of existing data because many data are incomplete in extent, defective in amount, not comparable in character, and have been set up on inconstant and inconsistent bases. Our statistics of crops are more or less imperfect; our statistics of wheat and flour stocks are seriously deficient. We possess no really dependable series of measures of domestic flour consumption or of wheat fed to animals. Important advances, however, have recently been made through the census reports of city-mill stocks and monthly millings. Appreciable errors are introduced into calculations through statistical conversions of wheat into flour, or flour into wheat, at the round figure of 4½ bushels to the barrel, and also by disregarding dockage and waste in computing wheat fed to animals.

The principal conclusions to be drawn from the analysis may be summarized.

(1) The statistical procedures now employed to measure the disappearance of wheat and the appearance and disappearance of wheat flour are technically inadequate in scope and incomplete in execution.

(2) The traditional method of reaching a figure for flour consumption specifically or human consumption generally (by subtracting from the sum of crop and carryover a series of items, several of which are inherently indeterminate) is unsound.

(3) To allow the sum total of the plus and minus errors of estimates of all the items in the appearance and disappearance of wheat to fall upon the item of flour production has the result of magnifying existing uncertainties and introducing new uncertainties into the appraisal of the situation of the wheat supply.

(4) Since a census of manufacturing production is in practice more accurate than a census of agricultural production, the method of estimating flour production directly represents the correct procedure to be followed.

(5) The monthly reports on wheat milling now being compiled by the Bureau of the Census are an indispensable contribution to our fund of information. Interpretation of the results of this census will be facilitated and improved when we are in possession of the results of the biennial census of 1925 and the quinquennial agricultural census. Until after the decennial census of 1930, it will not be possible to reach a close adjustment of the flour output reported in the monthly milling census to take account of non-reporting mills.

(6) The reports on stocks of wheat and flour in mill-hands now being compiled by the Bureau of the Census and the Millers' National Federation are important contributions to our knowledge of the carryover. It would be of advantage if the Millers' National Federation, acting as a trade association, would compile for flour regular statistics of operations and movements comparable to those compiled by the Department of Commerce for cotton and hides and their products.

(7) The inference seems warranted that correct data on flour milling will prove more helpful in estimating the wheat supply than improvement in wheat statistics will contribute to our knowledge of flour production. Data on disappearance of wheat can be used to check up on flour milling, and data on flour milling can be used to check up on the wheat supply; but the latter procedure seems the more promising.

(8) There are important variations in flour milling within the season, but com-

parable data cover too brief a period to yield a dependable index of typical seasonal variation. It is possible, however, to make some approach toward forecasting, from milling data for July–January, the milling output of the last five months of the trade year. Erratic movements of flour exports render difficult the forecast of both milling output and exports.

(9) On the assumption that the use of wheat in the diet of the country has been under the normal, millers and bakers have been urging the people to "eat more wheat." But since it is not possible to determine how much was ingested before the war, we lack the basis for comparison; and since accurate means of measuring flour production have but recently been developed, we lack a basis for judging the trend of consumption.

From a survey of existing practices we venture to advance recommendations for the amplification and perfection of statistical procedures designed to elucidate the disappearance of wheat and the appearance of wheat flour. These include the following:

(a) The addition of estimates as of December 1 and March 1 to the estimation of wheat stocks in city-mill hands, now for the first time being estimated for June 30 by the Bureau of the Census.

(b) The extension of current official estimates to include an additional earlier estimate as of December 1 for

(i) wheat on farms, and

(ii) wheat in country mills and elevators.

(c) The establishment of official estimates as of December 1, March 1, and June 30 for visible wheat in commercial hands (outside of country stocks), independent of the present trade estimate bearing the same name.

(d) The reporting of official estimates, by wheat regions as well as for the country as a unit, for

(i) farm reserves,

(ii) wheat in country mills and elevators,

(iii) visible supply, and

(iv) city-mill stocks.

(e) The reporting by wheat regions of

(i) wheat inspections, and

(ii) primary receipts and primary shipments.

(f) The segregation of durum wheat from flour wheats.

(g) The development of a system of reporting farm marketing.

In conclusion, study of the employment and usefulness of statistics of wheat (including crop, carryover, marketing, movement, stocks, milling, and exports) lends support to the view that business dealings in wheat (including those of farmers, elevators, coöperatives, grain merchants, millers, and exporters) would be improved and clarified if trading in wheat futures on established grain exchanges (indispensable in wheat commerce) could be extended to six calendar months, instead of four as at present. This would mean the following six evenly-spaced months designated as trading months in wheat futures: namely, July, September, November, January, March, and May. The reasons to be adduced in favor of amplification of the months of trading in wheat contracts, however, must be reserved for subsequent consideration.

TABLE I.—WHEAT SUPPLY AND DISTRIBUTION IN THE UNITED STATES, CROP YEARS BEGINNING JULY 1, 1914–15 TO 1924–25*

(Figures in thousands, except per capita)

Item	Unit	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20	1920–21	1921–22	1922–23	1923–24 [a]	1924–25 [a]
Area sown for harvest of year stated	Acre	54,781	61,592	56,852	56,191	65,177	76,251	65,988	65,907	69,746	66,241	57,520
Area harvested	Acre	53,541	60,469	52,316	45,089	59,181	75,694	61,143	63,696	62,317	59,659	54,209
Supply:												
Production	Bu.	891,017	1,025,801	636,318	636,655	921,438	967,979	833,027	814,905	867,598	797,381	872,673
Stocks, beginning of crop year:												
On farms	Bu.	32,236	28,972	74,731	15,611	8,063	19,261	49,546	56,707	32,359	35,894	30,980
In country mills and elevators [b]	Bu.	31,000	18,000	46,000	18,000	19,000	19,672	37,304	27,167	28,756	37,117	37,000
Visible supply (Bradstreet's)	Bu.	18,558	10,734	50,515	19,901	2,465	10,873	23,404	9,966	20,342	29,403	38,597
Flour, in terms of wheat	Bu.	8,766	7,371	11,259	8,586	4,023	7,402	10,274	6,651	7,461	10,049	9,207
Imports:												
Wheat	Bu.	426	5,703	24,139	28,177	11,122	4,780	51,004	14,465	18,013	27,283	6,179
Flour, in terms of wheat	Bu.	289	1,485	786	3,038	167	716	6,394	2,786	1,932	761	31
Total supply	Bu.	982,292	1,098,066	843,748	729,968	966,278	1,030,683	1,010,953	932,647	976,461	937,888	994,667
Distribution (except domestic disappearance):												
Exports, domestic:												
Wheat	Bu.	259,643	173,274	149,831	34,119	178,583	122,431	293,267	208,321	154,951	78,793	195,476
Flour, in terms of wheat	Bu.	72,822	69,843	53,743	98,460	108,819	97,433	72,810	71,086	66,972	77,637	62,638
Exports, foreign:												
Wheat	Bu.	181	575	54	1,053	499	94	778	4	148	28	
Flour, in terms of wheat	Bu.	7	46	10	358	4	58	207	379	60	60	
Shipments to possessions:												
Wheat	Bu.	119	104	77	23	21	55	70	67	81	102	125
Flour, in terms of wheat	Bu.	2,267	2,474	2,365	1,988	2,393	2,858	2,515	2,509	2,705	2,748	2,782
Stocks, end of crop year:												
On farms	Bu.	28,972	74,731	15,611	8,063	19,261	49,546	56,707	32,359	35,894	30,980	29,705
In country mills and elevators [b]	Bu.	18,000	46,000	18,000	19,000	19,672	37,304	27,167	28,756	37,117	37,000	25,000
Visible supply (Bradstreet's)	Bu.	10,734	50,515	19,901	2,465	10,873	23,404	9,966	20,342	29,403	38,597	31,803
Flour, in terms of wheat	Bu.	7,371	11,259	8,586	4,023	7,402	10,274	6,651	7,461	10,049	9,207	8,168
Seed requirements [c]	Bu.	84,997	78,456	77,544	89,944	105,226	91,063	90,952	96,249	91,413	79,378	88,000
Total distribution (except domestic)	Bu.	485,113	507,277	345,722	259,496	452,753	434,520	561,090	467,533	428,793	354,530	443,697
Total domestic disappearance [d]	Bu.	497,179	590,789	498,026	470,472	513,525	596,163	449,863	465,114	547,668	583,358	550,970
Disappearance per capita [e]	Bu.	5.041	5.905	4.908	4.573	4.924	5.640	4.199	4.285	4.981	5.238	4.885
Population, Jan. 1 (following year)	No.	98,635	100,050	101,465	102,880	104,296	105,711	107,126	108,541	109,956	111,371	112,786

* Data furnished by Division of Statistical and Historical Research, Bureau of Agricultural Economics, U. S. Department of Agriculture. Certain figures in final column, from official sources, inserted by Food Research Institute.

[a] Subject to revision.

[b] Stocks in country mills and elevators, from 1914 to 1918, are stocks in second hands less visible supply on July 1, as given by Chicago *Daily Trade Bulletin.*

[c] Seed requirements for acreage of following year, at 1.38 bu. per acre, for winter wheat acreage sown plus spring wheat acreage harvested.

[d] Food, feed, and loss.

[e] Food, feed, and loss, in bushels, not thousands.

NOTE. Users of this table should keep in mind (1) that a constant factor, 4.5 bu., is used in converting flour to terms of wheat while the quantity of wheat required to make a barrel of flour varies from year to year, due to variation in the milling quality of wheat; (2) that the quantity of wheat used as feed varies materially from year to year; (3) that stocks of flour are more nearly comparable with "visible supply" as used in wheat, and should not be understood or used as flour stocks in full; and (4) that the data in earlier years do not approximate accuracy as nearly as in the more recent years.

TABLE II.—CALENDAR OF WHEAT STATISTICS IN THE UNITED STATES

	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Winter wheat												
Acreage planted						X						
" abandoned											X	
Condition estimates	X					X				X	X	X
Forecasts and estimates of output	X	X				X				X	X	X
Spring wheat												
Acreage planted											X	
Condition estimates	X	X	X									X
Forecasts and estimates of output	X	X	X	X		X						X
Total wheat												
Revised estimate of output						X						
Wheat stocks												
On farms	X								X			
In country mills and elevators	X								X			
Of city mills [b]	X											
Visible supplies [a]	X	X	X	X	X	X	X	X	X	X	X	X
Carryover	X											
Flour stocks [b]	X											
Wheat movements												
Inspections [a]	X	X	X	X	X	X	X	X	X	X	X	X
Receipts at primary markets [a]	X	X	X	X	X	X	X	X	X	X	X	X
Shipments from primary markets [a]	X	X	X	X	X	X	X	X	X	X	X	X
Mill grindings	X	X	X	X	X	X	X	X	X	X	X	X
Imports for consumption [a]	X	X	X	X	X	X	X	X	X	X	X	X
Imports for grinding for export [a]	X	X	X	X	X	X	X	X	X	X	X	X
Exports of wheat	X	X	X	X	X	X	X	X	X	X	X	X
Exports of U. S. ground flour	X	X	X	X	X	X	X	X	X	X	X	X
Futures contract months												
United States	X		X			X					X	
Winnipeg	X			X		X					X	
Liverpool	X			X		X			X		X	

[a] Also weekly.

[b] Also compiled by Millers' National Federation for January 31 and June 30, 1925. Whether this will be regularly compiled year after year, on these dates or on others, is not known.

TABLE III.—PER CAPITA WHEAT FLOUR SUPPLIES FOR DOMESTIC USE, 1914–15 TO 1924–25, BASED ON RUSSELL'S ESTIMATES OF FLOUR PRODUCTION

Crop year July–June	Flour production [a] *(thousand barrels)*	Net exports [b] *(thousand barrels)*	Net supply *(thousand barrels)*	Population [c] *(thousands)*	Per capita supply	
					As flour *(barrels)*	As wheat *(bushels)*
1914–15	111,969	16,120	95,849	98,635	.97	4.37
1915–16	122,064	15,201	106,863	100,050	1.07	4.82
1916–17	115,584	11,771	103,813	101,465	1.02	4.59
1917–18	115,390	21,284	94,106	102,880	.91	4.10
1918–19	121,425	24,146	97,279	104,296	.93	4.19
1919–20	129,395	21,505	107,890	105,711	1.02	4.59
1920–21	106,427	14,805	91,622	107,126	.86	3.87
1921–22	122,692	15,246	107,446	108,541	.99	4.46
1922–23	129,662	14,451	115,211	109,956	1.05	4.73
1923–24	129,767	17,090	112,677	111,371	1.01	4.55
1924–25	127,889	13,894	113,995	112,786	1.01	4.55

[a] *Russell's Commercial Review.*

[b] Official data.

[c] Approximation for January 1 by averaging two official estimates for July 1 preceding and following.

TABLE IV.—PER CAPITA ANIMAL FEED AND WASTE, 1914–15 TO 1924–25, COMPUTED FROM PER CAPITA WHEAT DISAPPEARANCE AND FLOUR PRODUCTION*

(Bushels)

	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20	1920–21	1921–22	1922–23	1923–24	1924–25
Total domestic wheat disappearance (U.S.D.A.)	5.04	5.91	4.91	4.57	4.92	5.64	4.20	4.29	4.98	5.24	4.88
Flour production (Russell) less net exports	4.37	4.82	4.59	4.10	4.19	4.59	3.87	4.46	4.73	4.55	4.55
Animal feed and waste	0.67	1.09	0.32	0.47	0.73	1.05	0.33	−0.17	0.25	0.69	0.33

* See Tables I and III.

NOTE. Since there are considerable errors in each of the first two items, the differences shown as "animal feed and waste" may be wide of the truth. While considerable variations in this item certainly occur, the variations shown appear impossibly large, and a negative item, such as that shown for 1921–22, is inconceivable.

TABLE V.—PER CAPITA DOMESTIC FLOUR SUPPLY COMPUTED FROM WHEAT DISAPPEARANCE, 1914–15 TO 1924–25

	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20	1920–21	1921–22	1922–23	1923–24	1924–25
Total domestic disappearance *(million bu.)*[a]	497.2	590.8	498.0	470.5	513.5	596.2	449.9	465.1	547.7	583.4	551.7
Average wheat fed on farms *(million bu.)*[b]	72.2	83.1	51.5	51.6	74.6	78.4	67.5	66.0	70.3	64.6	70.7
Used for food *(million bu.)*	425.0	507.7	446.5	418.9	438.9	517.8	382.4	399.1	477.4	518.8	481.0
Flour equivalent *(million bbl.)*[c]	94.5	112.8	99.2	93.1	97.5	115.1	85.0	88.7	106.1	115.3	106.9
Flour per capita *(bbl.)*	0.958	1.127	0.978	0.905	0.935	1.089	0.793	0.817	0.965	1.035	0.948

[a] From Table I.

[b] Calculated by applying to each estimated crop the figure of 8.1 per cent, which the Department of Agriculture derived from estimates of crop reporters, November 1923, as the "usual" disposition—fed to livestock. The Department noted that, "because of unsatisfactory wheat-price situation at time of inquiry estimates of 'fed to livestock' may be slightly excessive." *Agriculture Yearbook, 1923*, p. 660.

[c] Figure for food use divided by 4.5.

NOTE. The per capita figures shown in this table are not to be taken seriously. There are no grounds for believing that the flour consumption actually varies from year to year to any such degree. The table is prepared merely to show what results follow from using the data available for this period. The item of total disappearance and the conversion of wheat to flour both involve a considerable margin of error. But the least satisfactory figure of all is that for "average wheat fed on farms." The percentage employed (8.1) is itself not highly reliable even as an average, and there are certainly considerable variations in this percentage from year to year. Finally, the computation leaves out of account other wheat fed to livestock and other loss and waste. See text, pp. 308–310.

TABLE VI.—CENSUS DATA ON WHEAT GROUND AND FLOUR PRODUCTION, JULY 1923 TO JUNE 1925*

Year and month	All mills reporting				Identical mills [a]	
	Number reporting	Wheat ground (thousand bushels)	Wheat flour (thousand barrels)	Bushels of wheat per barrel of flour	Wheat ground (thousand bushels)	Wheat flour (thousand barrels)
1923 July	1,054	35,871	7,805	4.60	35,249 [a]	7,672 [a]
Aug.	1,068	44,179	9,642	4.58	43,246	9,428
Sept.	1,069	44,969	9,760	4.61	43,775	9,504
Oct.	1,069	50,810	10,983	4.63	49,354	10,673
Nov.	1,081	43,606	9,403	4.64	42,053	9,075
Dec.	1,094	37,799	8,137	4.65	36,680	7,898
1924 Jan.	1,100	41,834	8,970	4.66	40,103	8,605
Feb.	1,115	39,180	8,433	4.65	37,574	8,090
Mar.	1,094	38,809	8,355	4.65	37,399	8,053
Apr.	1,082	35,680	7,682	4.64	34,474	7,428
May	1,075	36,688	7,896	4.65	35,376	7,615
June	1,060	36,293	7,797	4.65	36,180	7,559
July	1,066	39,272	8,465	4.64	38,611 [a]	8,323 [a]
Aug.	1,069	45,434	9,842	4.62	44,248	9,595
Sept.	1,060	47,857	10,459	4.58	46,649	10,198
Oct.	1,069	51,863	11,371	4.56	50,476	11,070
Nov.	1,050	41,982	9,187	4.57	41,248	9,017
Dec.	1,052	40,428	8,855	4.57	39,611	8,680
1925 Jan.	1,050	45,010	9,853	4.57	43,764	9,576
Feb.	1,056	37,720	8,248	4.57	36,447	7,971
Mar.	1,067	33,548	7,347	4.57	32,530	7,125
Apr.	1,058	31,066	6,781	4.58	30,308	6,617
May	1,048	31,874	6,942	4.59	30,791	6,704
June	1,001	35,211	7,678	4.59	34,362	7,491

* Source: Press releases, U. S. Department of Commerce.

[a] For the crop year 1923–24, the figures are for 955 identical mills, which produced approximately 82 per cent of the estimated total wheat flour production reported in 1921. For the crop year 1924–25 the figures are for 949 identical mills which produced approximately 87 per cent of the estimated total wheat flour production reported in 1923.

TABLE VII.—OUTPUT OF WHEAT FLOUR, MONTHLY AND QUARTERLY, 1914–15 TO 1924–25*

(Thousand barrels)

Month or quarter	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20	1920–21	1921–22	1922–23	1923–24	1924–25
July	8,975	7,321	9,447	2,875	6,515	7,596	8,152	10,720	10,321	10,408	10,395
Aug.	10,965	8,645	11,231	5,714	10,238	12,042	9,059	13,266	12,271	12,019	11,812
Sept.	11,429	11,215	10,674	10,528	12,161	14,087	9,650	13,349	12,540	11,995	13,798
Oct.	12,254	12,723	11,456	13,856	11,544	15,008	9,981	13,917	13,581	12,561	13,404
Nov.	10,660	14,213	12,669	16,601	10,987	13,519	9,889	10,166	13,424	11,524	11,665
Dec.	9,608	12,437	8,960	17,064	12,009	12,865	8,745	8,856	11,049	10,778	11,007
Jan.	10,542	11,686	9,118	10,382	10,593	13,005	8,924	9,496	10,137	11,000	11,705
Feb.	9,012	9,768	7,402	9,185	7,736	9,557	7,066	9,232	9,425	10,286	10,189
Mar.	7,059	9,338	8,207	9,049	10,498	8,632	9,100	9,658	10,607	10,578	9,307
Apr.	6,933	8,531	9,608	6,893	11,276	7,374	9,368	7,823	8,969	9,521	8,183
May	7,171	7,722	9,521	6,459	10,738	8,249	8,406	8,073	9,007	9,765	8,151
June	7,361	8,465	7,291	6,784	7,130	7,461	8,087	8,136	8,331	9,332	8,917
Total	111,969	122,064	115,584	115,390	121,425	129,395	106,427	122,692	129,662	129,767	128,533 [a]
July–Sept.	31,369	27,181	31,352	19,117	28,914	33,725	26,861	37,335	35,132	34,422	36,005
Oct.–Dec.	32,522	39,373	33,085	47,521	34,540	41,392	28,615	32,939	38,054	34,863	36,076
Jan.–Mar.	26,613	30,792	24,727	28,616	28,827	31,194	25,090	28,386	30,169	31,864	31,201
Apr.–June	21,465	24,718	26,420	20,136	29,144	23,084	25,861	24,032	26,307	28,618	25,251

* Data from *Russell's Commercial Review.*

[a] Revised figure, 127,889.

TABLE VIII.—PERCENTAGES OF ANNUAL OUTPUT OF WHEAT FLOUR PRODUCED MONTHLY AND QUARTERLY, 1920–21 TO 1924–25*

Month or quarter	1920–21	1921–22	1922–23	1923–24	1924–25
July	7.66	8.74	7.96	8.02	8.09
Aug.	8.51	10.81	9.46	9.26	9.19
Sept.	9.07	10.88	9.67	9.24	10.73
Oct.	9.38	11.34	10.47	9.68	10.43
Nov.	9.29	8.29	10.35	8.88	9.07
Dec.	8.22	7.22	8.52	8.31	8.56
Jan.	8.38	7.74	7.82	8.48	9.11
Feb.	6.64	7.52	7.27	7.92	7.93
Mar.	8.55	7.87	8.18	8.15	7.24
Apr.	8.80	6.38	6.92	7.34	6.37
May	7.90	6.58	6.95	7.53	6.34
June	7.60	6.63	6.43	7.19	6.94
Total	100.00	100.00	100.00	100.00	100.00
July–Sept.	25.24	30.43	27.09	26.52	28.01
Oct.–Dec.	26.89	26.85	29.35	26.87	28.07
Jan.–Mar.	23.57	23.13	23.27	24.56	24.27
Apr.–June	24.30	19.59	20.29	22.05	19.65

* Based on Table VII.

TABLE IX.—RUSSELL'S ESTIMATES OF WHEAT FLOUR OUTPUT BY SEVEN-MONTH AND FIVE-MONTH PERIODS*

Year ending June 30	Output (thousand barrels)		Percentage of total for year	
	July–Jan.	Feb.–June	July–Jan.	Feb.–June
1914–15	74,433	37,536	66.48	33.52
1915–16	78,240	43,824	64.10	35.90
1916–17	73,555	42,029	63.64	36.36
1917–18	77,020	38,370	66.75	33.25
1918–19	74,047	47,378	60.98	39.02
1919–20	88,122	41,273	68.10	31.90
1920–21	64,400	42,027	60.51	39.49
1921–22	79,770	42,922	65.02	34.98
1922–23	83,323	46,339	64.26	35.74
1923–24	80,285	49,482	61.87	38.13
1924–25	83,786	44,747	65.19	34.81
Averages				
Eleven years	77,907	43,266	64.29	35.71
Omitting 1917–18	77,996	43,756	64.06	35.94
1920–21 to 1923–24	76,944	45,192	63.00	37.00

* Data from *Russell's Commercial Review.*

TABLE X.—MONTHLY EXPORTS OF WHEAT FLOUR FROM THE UNITED STATES, 1919–20 TO 1924–25*

Month	Actual exports (thousand barrels)						Percentage of total exports for the year					
	1919–20	1920–21	1921–22	1922–23	1923–24	1924–25	1919–20	1920–21	1921–22	1922–23	1923–24	1924–25
July	1,731	2,404	1,238	921	884	789	7.99	14.86	7.84	6.19	5.12	5.61
Aug.	1,638	1,107	1,873	1,169	1,273	949	7.57	6.84	11.86	7.85	7.38	6.82
Sept.	1,764	938	1,802	1,301	1,568	1,463	8.15	5.80	11.41	8.74	9.09	10.52
Oct.	1,621	1,607	1,557	1,510	2,092	1,872	7.49	9.93	9.85	10.15	12.12	13.45
Nov.	1,840	1,101	1,246	1,556	1,778	1,616	8.50	6.81	7.89	10.45	10.30	11.62
Dec.	1,313	952	1,014	1,500	1,789	1,452	6.06	5.88	6.42	10.08	10.37	10.44
Jan.	843	1,280	1,105	1,161	1,716	988	3.89	7.91	6.99	7.80	9.95	7.10
Feb.	1,254	1,023	1,203	1,379	1,539	939	5.79	6.32	7.62	9.27	8.92	6.75
Mar.	2,209	1,369	1,495	1,430	1,426	1,387	10.20	8.46	9.46	9.61	8.26	9.97
Apr.	2,121	1,591	1,243	1,167	1,038	955	9.80	9.83	7.87	7.84	6.02	6.87
May	3,339	1,265	1,089	983	977	690	15.42	7.82	6.89	6.60	5.66	4.96
June	1,979	1,543	932	806	1,174	820	9.14	9.54	5.90	5.42	6.81	5.89
Total	21,652	16,180	15,797	14,883	17,254	13,920	100.00	100.00	100.00	100.00	100.00	100.00

* Source: *Monthly Summary of Foreign Commerce of the U. S.*

TABLE XI.—MONTHLY EXPORTS OF WHEAT FLOUR FROM CANADA, 1919–20 TO 1924–25*

Month	Actual exports (thousand barrels)						Percentage of total exports for the year					
	1919–20	1920–21	1921–22	1922–23	1923–24	1924–25	1919–20	1920–21	1921–22	1922–23	1923–24	1924–25
July	1,195	433	465	486	775	613	16.56	6.47	6.02	4.54	6.36	6.15
Aug.	1,171	288	454	591	657	626	16.22	4.31	5.88	5.52	5.39	6.28
Sept.	463	310	361	697	456	967	6.41	4.64	4.68	6.50	3.74	9.70
Oct.	591	570	659	855	1,155	1,145	8.19	8.52	8.54	7.98	9.48	11.49
Nov.	785	744	856	1,214	1,357	905	10.88	11.12	11.09	11.33	11.14	9.08
Dec.	1,237	608	748	1,463	1,390	828	17.14	9.09	9.69	13.66	11.41	8.31
Jan.	388	704	632	1,025	1,052	875	5.37	10.53	8.19	9.57	8.64	8.78
Feb.	236	623	665	779	1,092	834	3.27	9.31	8.61	7.27	8.96	8.37
Mar.	236	821	986	1,221	1,398	1,385	3.27	12.27	12.77	11.40	11.48	13.90
Apr.	148	535	512	832	890	710	2.05	8.00	6.63	7.76	7.31	7.12
May	102	518	617	645	1,057	482	1.41	7.74	7.99	6.02	8.68	4.84
June	666	535	765	905	903	596	9.23	8.00	9.91	8.45	7.41	5.98
Total	7,218	6,689	7,720	10,713	12,182	9,966	100.00	100.00	100.00	100.00	100.00	100.00

* Source: *Canadian Grain Statistics.*

This study is chiefly the work of Alonzo E. Taylor. For information and advice on numerous points the Institute is indebted to several members of the grain and milling trades.

WHEAT STUDIES

OF THE

FOOD RESEARCH INSTITUTE

STANFORD UNIVERSITY, CALIFORNIA

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DEVELOPMENTS IN THE WHEAT SITUATION APRIL TO JULY, 1925

I. INTRODUCTION

The dominant influence in the world wheat situation, during the last four months of the crop year ending July 31, was the changing prospects for new crops of wheat and rye. The outstanding features of the period were considerable instability of wheat prices, unusually low export shipments, and somewhat more than the usual seasonal declines in visible supplies.

Because of the narrow margin between supplies and requirements in 1924–25, the changing prospects for new crops influenced developments to a somewhat unusual degree. In particular, good prospects in North Africa, Europe, Russia, and Canada led European importers to reduce their current demands; this reacted on prices and movements in exporting countries, and, in turn, on exports and carryovers. The United States winter-wheat prospects continued very poor, but the spring-wheat outlook, especially in the far northwest, has varied considerably. The Canadian crop has consistently promised well, but forecasts have varied from 350 to 500 million bushels, and later developments have dampened early hope of a bumper crop.

The present outlook is for a wheat crop in the northern hemisphere, outside of Russia, 155 million bushels larger than the poor crop of last year. So great is the reduction in the American winter-wheat crop that only a small net export can be expected from the United States. The Russian crops, however, are much larger this year than last. In view of this fact and the different distribution of the 1925 crops, the prospective position of the world wheat market appears distinctly easier than it was in 1924–25; but the position of the American market appears relatively tighter.

Introduction

Price Fluctuations and Market Position

International Trade

Supplies at the End of the Year

Outlook for 1925 Crops

The New Crop Year

Wheat prices, after the pronounced decline in February and March, 1925, reached bottom early in April. A brief recovery was soon checked, but from late in April prices rose substantially, until early in June, in Liverpool and the United States, they were about at the same level as late in December and some 30 cents higher than at the low point of early April; in Canada, where the preceding decline had been most severe, cash wheat and May futures rose by about 60 cents between April 5 and May 28. In the next five weeks there was a substantial decline which wiped out the entire gain, except in Canada, where prices in May and June were often higher than in Liverpool. Toward the middle of July prices again

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rose sharply, gaining about 15 cents in less than two weeks, to decline again after July 18 and recover somewhat late in the month.

Over the period as a whole, prices showed no pronounced change in level. Broadly speaking, the level around which prices fluctuated was 35 cents below the level of last February, but about 50 cents above the level of April–May–June 1924. The fluctuations, though larger than usual at this season, were far less considerable than those of the preceding four months.

Wheat shipments from export areas were unusually low. Broomhall's figures show an 18-weeks total of 188 million bushels, against 232 and 273 millions respectively for corresponding periods of 1922–23 and 1923–24. Low figures were characteristic both of North America and the southern hemisphere, and negligible quantities moved from other export regions. While the low movement is in part explained by exceptionally heavy shipments in the earlier portions of the crop year, it was smaller than many observers had anticipated.

Visible supplies of wheat in the northern hemisphere declined continuously throughout this period, except that in the United States the arrivals of new crop wheat brought the visible for August 1 to a little above that of July 1. Country reserves at the end of the crop year, while lower than usual, especially in Europe, were reported not much below average in the United States. The Argentine carryover was larger than usual, the Australian below average size. Supplies in Great Britain and afloat were reported somewhat lower than usual in recent years, and reserves on the European continent were generally low. On the whole, the world carryover on August 1 was distinctly smaller than those of the two preceding years, but not extremely low as compared with less abnormal periods.

In the following sections these subjects are discussed in some detail, and in conclusion attention is given to the present outlook for the crop year 1925–26.

II. PRICE FLUCTUATIONS AND THE MARKET POSITION

Chart 1, showing the daily quotations for the nearest future option in the three principal international markets, gives a good bird's-eye view of the course of the wheat market during the months of January–July 1925. The closing out of the May and July options caused these quotations to fluctuate somewhat abnormally in these particular months, but in general the quotations are fairly representative of the market movement during this period.

The advance and severe decline of the first three of these months were discussed in our previous survey.[1] From the first week in April until the first week in June, prices tended upward, although the rise was not steady, and there was a break from the May to the July option. In most of June, on the other hand, prices moved abruptly and consistently downward. A rally in the first fortnight of July was succeeded by another slump, which eased off in uncertainty toward the end of the month. In the United States the July option advanced abruptly on the last day of the month because of a "squeeze" on the Chicago Board of Trade, but this was not typical of the market.

At approximately the opening of this period—i.e., on April 3—the May option in Chicago was quoted at $1.41 and the July option at $1.31. On June 6, at the culmination of the advance, the May option was no longer quoted, but July wheat was then at $1.69. A month later, on July 3, the July option was back at $1.42 and the September was quoted at $1.40. During July the September option reached a high point of $1.59 on July 17, but reacted and closed at $1.49 on the last day of the month. The July option closed 17 cents higher than this, but for entirely local reasons. The range of the period in the Chicago market, disregarding "special conditions," was thus from approximately $1.40 to $1.70 a bushel. The September option, which alone was quoted throughout the four months, opened at about $1.30 and closed at about $1.50; but this increase is partially explained by the

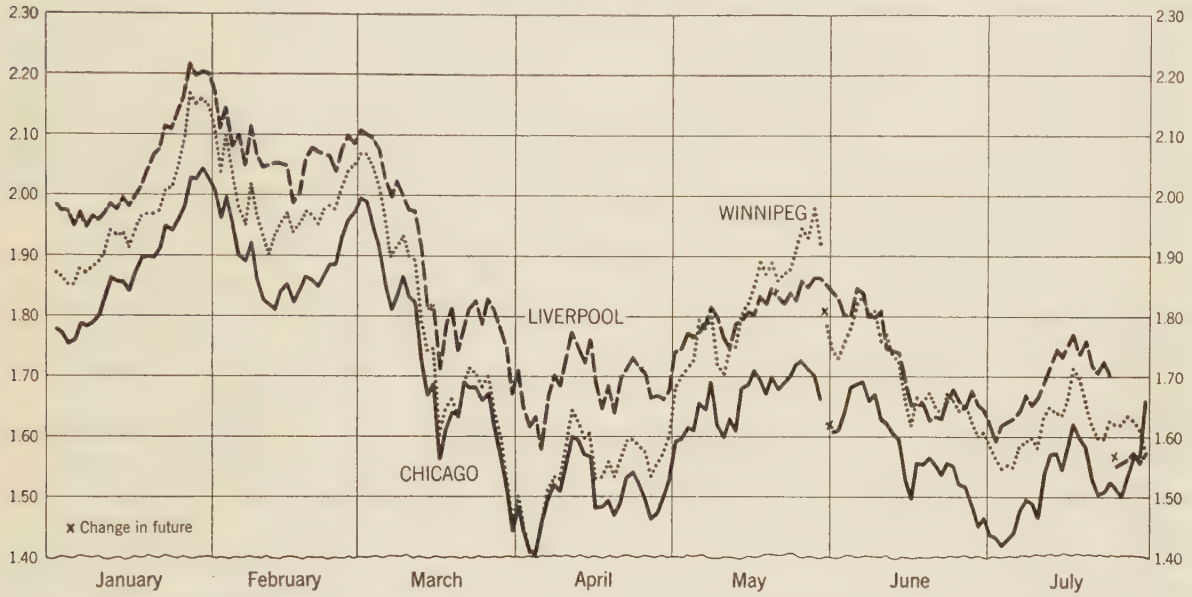
[1] WHEAT STUDIES, April 1925, I, 145–150.

reaction from the extreme depression and the accumulation of carrying charges. Cash prices were much the same near the end of July as near the beginning of April.

The course of futures prices in Liverpool and Buenos Aires was substantially similar to that at Chicago, except at the end of May and July. In Winnipeg, however, the advance during April and May was considerably greater in old crop options and the succeeding decline was somewhat more severe.

Chart 1.—Prices of Wheat Futures in Chicago, Winnipeg, and Liverpool, Daily, January–July, 1925*

(Dollars per bushel)



* Data from *Chicago Journal of Commerce*, and *Daily Market Record*. Quotations for nearest future.

The American Market

The strength of the American market during April and May was the result primarily of the poor prospect for winter wheat in the United States and the activities of trading interests which were "short" in May wheat. The market was also apparently supported by expectations of a revival of European demand for imported wheat.

The report issued by the United States Government on April 9, indicating a winter-wheat condition only 68.7 per cent of normal (as compared with a ten-year average conditions on April 1 of 81.2), gave a decided boost to the market. This was somewhat offset by the fact that the drought in the southwest, on which the low-condition report was in part based, was broken during the early weeks of April; but it was evidently the opinion of the trade that these rains could not repair the damage suffered during the winter.

Although European buyers were not actively in the market during April, a considerable and influential element of the trade was convinced that Europe would have to make large purchases in the United States before her new crop became available. It was known that she could not supplement her supply appreciably from the new Indian crop, and the other leading exporters had shipped so heavily earlier in the season that it was thought their supplies were insufficient to fill prospective needs prior to harvest. Even Broomhall anticipated a revival of European buying before the season closed. Under these circumstances the market continued to receive speculative support even though purchases by mills and for export were light. Receipts at primary markets during April and later were not small for the time of year, but they were not large enough to weaken the market.

By the end of April it was clear that the United States crop had suffered severely during the winter. Unofficial estimates of the area abandoned because of winter killing ran as high as 20–21 per cent. The May 1 condition reports issued by commercial crop experts were distinctly bullish. The adverse reports of the New York *Journal of Commerce,* in particular, were given wide currency. The report issued by the government on May 8, although confirming the high estimates of abandonment already published, appeared to show the condition of the crop much more favorably than a month earlier and only 8.2 points below the ten-year average for that date. The divergence from other estimates gave rise to heated discussions over the government "par" system of expressing condition.[1] The May 1 official report placed a temporary damper on the market, but with the "tight" position that was developing in the May option because of the insufficiency of wheat of deliverable grade in Chicago, the decline was brief and not severe. Toward the end of May, extremely unseasonable weather in many parts of the wheat belt, with freezing temperatures over wide areas, gave further confirmation to the earlier reports of damage and caused sharp advances in the July and September options. (See Chart 2, p. 333.)

During this period the view that the United States would be on a domestic basis during the next crop year[2] began to gain adherents. It was generally agreed that the winter crop would not greatly exceed 400 million bushels. The spring crop was promising, but even reckoning on a spring crop of 300 million bushels—a figure exceeded only three times in the last fifteen years—it was calculated that the total supply of the country would only take care of normal domestic requirements, except for "incidental" exports of durum and Pacific soft wheat and low-grade flours. Good crops in the Pacific region were not expected to replace losses in hard winter wheat. Under these circumstances certain elements of the trade anticipated a marked advance in prices before the end of the crop year.

[1] See explanation by Nat C. Murray in *Modern Miller,* Aug. 15, 1925.

[2] See Section VI below.

When the government report indicating the June 1 condition of winter and spring wheat was issued on June 9, it pointed to deterioration in May but did not support trade opinion as to the extent of the decline during the month. Accordingly, there was a reaction in prices brought about by liquidation and short selling which continued, for this and other reasons, until early July. One of the important "other reasons" was the fact that Europe continued indifferent to American crop prospects. Excellent prospects in the spring-wheat belt, both here and in Canada, also favored a lower price level. Damage from one or another of the usual causes was widely rumored, but little credence was given to the reports. The American market apparently concluded that until more was known about the spring-wheat crop, it was dangerous to count on the United States being on a domestic basis. With crop prospects excellent in Europe and Canada, it seemed certain that world supplies for the new year would be forthcoming. Under these circumstances, the "long" holdings that had been built up in the speculative market during the preceding two months were extensively liquidated.

The advance in prices early in July was the market reaction to the unfavorably hot weather that developed at that time. Important portions of the United States spring-wheat belt were affected as well as the Canadian northwest. Since the crop was in a vulnerable stage of growth in much of this region, it was feared that the heat would cause serious damage. With the subsequent improvement in the weather in the northwest, the market again reacted downward under the influence of short selling; but not to the preceding low level, since it was held that the spring crop had actually suffered, especially in quality. On the last day of the month a small "squeeze" in the July option developed on the Chicago Board of Trade, with the result that the July contract closed 16 cents higher than the September future quotation on the same day.

Other Markets

The Canadian market was subject to the same general influences as the American.

But the narrow supply there, combined with the limited nature of the futures market at Winnipeg, caused the old crop future options (May and July deliveries) to rise considerably higher on the early advance than was the case in American markets. This was notably true of the May option which, according to reliable reports, was deliberately congested and controlled by combination. The pool and other traders apparently held enough wheat to force short interests to pay an exorbitant price. The July option received speculative support on the theory that it too could be advanced to artificial levels, but instead it weakened and closed only 7 cents above the September option at Chicago. During much of June, however, it was quoted little above the level of the July option in Liverpool. Indeed, whereas in late March and early April Winnipeg prices had been only slightly above Chicago prices, the margin widened later in April, and throughout most of the period here under review Winnipeg prices for the July option were ten cents or more above Chicago prices. (See Chart 3.)

The Liverpool market was less buoyant than the American. Price fluctuations were on the whole similar to those in Chicago, but usually less severe. The phenomenal dullness of international trade, combined with the good European crop situation, limited speculative interest.

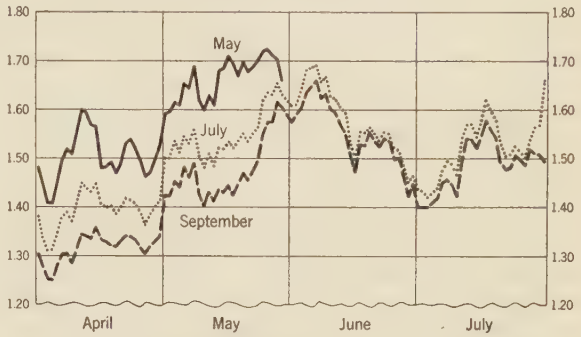
In Buenos Aires also, fluctuations were broadly similar to those in Chicago but much less pronounced. Except for a few days early in April and two weeks early in July, prices ranged from about $1.50 to about $1.70, with the maximum late in May as elsewhere. Buenos Aires prices were above Chicago prices, for the most part, until July.

Old Crop Prices at a Premium over New

Throughout this period, except in Argentina, old crop wheat prices were at a considerable premium over new crop options, indicating the relative scarcity of old supplies. Charts 2 and 3 present graphically the situation in the Winnipeg and Chicago markets. In Canada the wheat delivered on a July option would necessarily be from the old crop, while in the United States it might be from the new. In both countries the old crop options closed at appreciable premiums over the new, but the difference was considerably greater in Canada than in the United States because

Chart 2.—Prices of Wheat Futures in Winnipeg, Daily, April–July, 1925*

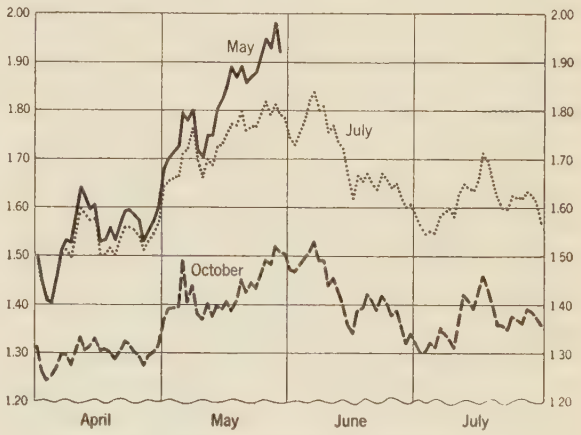
(Dollars per bushel)



* Data from *Chicago Journal of Commerce.*

Chart 3.—Prices of Wheat Futures in Chicago, Daily, April–July, 1925*

(Dollars per bushel)



* Data from *Chicago Journal of Commerce.*

of the different relations between old and new crops. The most striking disparity appeared in Canada, where the July option was 20–30 cents above the October option. The margin was greatest in May and early June, when the new crop looked most promising.

In the United States cash wheat of grades deliverable on future contracts was consistently at a premium over the future options of nearest date (except in the last

days of July), until the new crops became available—another indication of the relative scarcity of old crop wheat. The strength of the cash market resulted rather from the strong position of holders than from active demand from users. Milling and export demands were light, though June grindings were notably higher than in May. With substantial mill stocks in hand,[1] with adequate supplies in sight from the new crops, and with prices for grain of future delivery at a discount, few would buy who could postpone purchases until new wheat was available. The closing out of the May and (to a less degree) the July options gave support to the buying side during those months, since short interests were forced to fill their delivery requirements, but otherwise buying was from hand to mouth. As the new crop reached the market, premiums (except for quality) disappeared.

Canadian cash wheat was also dear, although not consistently at a premium over the nearest future. Small quantities of cash wheat, however, could be bought at both American and Canadian ports throughout the period at prices lower than the Winnipeg or Chicago prices plus transportation and other costs.

In Liverpool and on the Continent also, old crop options were at a considerable premium, partly because of local supply relationships, partly as a reflection of conditions in the exporting countries, but chiefly because of high expectations from new crops. In Buenos Aires, on the other hand, where new harvests were remote, the various options were close together, and later futures were at a slight premium. This reflects expectations of higher prices in the autumn, and helps to explain why Argentine shipments during the period were below expectations.

International Comparisons

The Liverpool cash market affords the best material for study of international price relations, since whenever an exporting country has wheat for shipment there is almost certain to be a quotation on that market. Comparative monthly averages for leading grades in Liverpool are therefore presented in Table 1, and weekly averages in Appendix Table XIII.

Table 1.—Average Prices of Leading Grades of Wheat in Liverpool, April–July, 1925*

Month	No. 1 Manitoba	No. 3 Manitoba	No. 2 Winter	No. 1 Northern Duluth	Rosafé	Australian
April	$1.76	$1.68	$1.67	$1.67	$1.71	$1.72
May	1.97	1.87	1.86	1.83	1.87	1.79
June	1.91	1.81	1.87	1.80	1.78	1.79
July	1.80	1.72	1.65[a]	1.71	1.72	1.67

* For sources, and weekly data, see Appendix Table XIII.
[a] First two weeks only.

Throughout most of the period American and Australian wheats were the cheapest available from the more important exporting countries. Canadian wheat, especially that of high quality, was dear. Argentine wheat was usually (though not always) higher than American or Australian. Statements that American prices were too high to permit exportation must therefore be taken with reservation. Probably more Australian wheat was delivered on contracts in Liverpool during this period than wheat of any other kind, but Duluth Northern was also delivered in considerable quantities. At the end of July, No. 2 red winter was the cheapest wheat quoted in Broomhall's *Corn Trade News* for early delivery. American hard winter, however, was not quoted. Although Canadian wheat for October delivery was relatively cheap, old crop Canadian wheat, even of No. 3 grade, was scarce and high.[2]

Monthly averages disguise the wide variations from day to day in the relative position of the different wheats. An experienced exporter states that there has rarely been a year when fluctuations in "differences" have been so radical. Wheat could frequently be bought in Liverpool at appreciably less than the price for which it could be obtained on the same date in Sydney, Buenos Aires, or Chicago (allowing for transportation costs); in other words, the markets in exporting countries were sometimes stronger than the Liverpool market. At times there was a considerable volume

[1] See below, p. 341.
[2] Cf. Broomhall's *Corn Trade News*, July 28, 1925.

of "distress" or "near distress" wheat to be picked up in Liverpool.[1]

As always, prices for domestic wheat in European countries have been partially influenced by international market factors, partially by domestic conditions. In general, April was the lowest month since December. Prices advanced from early in April, until early in June, as the supply of old wheat became increasingly small, but declined sharply in later June and July as good crop prospects were confirmed and new wheat began to be available.[2] It is interesting to contrast the prediction of a prominent American speculator in April, that "wheat will be priceless in Europe in June," with the statement of a leading British grain merchant on July 1, 1925, that ". . . the general sentiment at present is very bearish, and . . . buying is only of a hand-to-mouth nature. . . . The demand is entirely absent and worse than I have known it at any time since the end of the war."

Large Speculative Activity

The fluctuating prices of the four months under review were the natural result of the approach to exhaustion of old crop supplies in North America, the prospect of very small crops of American winter wheat, the difficulties in predicting European demand in the face of good crop prospects, and the high degree of uncertainty concerning the volume of spring wheat to be harvested in the United States and particularly in Canada. Under such conditions speculation thrives, but there is reason to believe that, because of severe losses by speculative traders in February and March, the bulk of the more recent speculative trading was professional.

The volume of future trading in the United States, which had been much heavier than usual in the first eight months of the crop year, therefore continued heavy in the last four, as shown by the following data for the average daily volume of trading in futures, in million bushels, in all American markets:

Year	Aug.–July	Aug.–Mar.	Apr.–July
1921–22	48.0	51.7	40.6
1922–23	37.1	35.4	40.5
1923–24	26.1	24.2	29.9
1924–25	63.2	64.4	60.8

While the volume of trade was lower in April–July than in January–March, 1925 (see Appendix Table XII), it was much higher even than in 1920, when the market was quite unsettled. There are numerous indications that the volume of speculative transactions was also unusually large in Canada.

Considering the price fluctuations in the light of actual information as to acreage, condition, development of plantings, climatic circumstances, devastations of pests, mill grindings, exports, and the various other circumstances affecting supply and demand, one cannot resist the conviction that the possible meanings of these facts were exaggerated in one direction by the "bulls" and in the other direction by the "bears"; and that the extent of the oscillations in price was in some degree the result of motivated exaggerations in the interpretation of the developing facts as expressed in buying and selling orders on the grain exchanges.

III. INTERNATIONAL TRADE, APRIL–JULY, 1925

Last April most experienced observers recognized that the international movement of wheat in the first eight months of the crop year had been heavier, on account of rapid marketing and shipments in the fall and winter, than could be expected to continue through the last four months.[3] It was also clear that the further movement would depend in considerable measure on crop developments, particularly in Europe and North Africa; and the favorable early indications in these areas also suggested a smaller scale of trade.[4] Both views were

[1] According to testimony recently given before the Royal Commission on Food Prices, these conditions are not at all uncommon.

[2] See Appendix Table XIV.

[3] See Wheat Studies, April 1925, I, 152–155, 168.

[4] *Ibid.*, 162–165.

realized, but the curtailment of shipments and imports was somewhat greater than most observers anticipated.

Exports Below Trade Expectations

Broomhall, from early March until the middle of May, expected world shipments for the crop year to reach 752 million bushels, of which a balance of 225 millions remained to be shipped in the last 18 weeks.[1] Early in August he reported that actual shipments had been 715 million bushels, including some from minor countries not listed week by week. Hence shipments in the last 18 weeks of the crop year were not more than 188 millions—less by 37 million bushels (16 per cent) than his expectations. (See Table 2.) Actual shipments in the last 18 weeks were only about 26 per cent of the year's total, as against a usual percentage of about 34 and an expected percentage of about 30. Broomhall greatly overestimated the Argentine shipments, and underestimated only those of Australia and minor exporters.

Table 2. — Broomhall's March 3 Estimate of Shipments for 1924–25 and the Last 18 Weeks, Compared with Actual Reported Shipments*

(Million bushels)

Export area	Crop year ending July 31		Last 18 weeks	
	March 3 estimate	August report	March 3 estimate	August report
North America	436	422.6	117.5	104.1
Argentina and Uruguay	152	121.4	61.4	30.8
Australia	104	117.1	31.3	44.4
India	40	31.7	12.6	4.3
Danube and Black Sea	20	13.5	1.9	4.4
Other countries		8.9		
Total	752	715.2	224.8	188.0

* Data from Broomhall's *Corn Trade News*. See also Appendix Table VII.

Our own April estimate, on the basis of net exports rather than shipments, and including the United States on a July–June crop year and Canada on a September–August crop year, was 749 million bushels, of which 729 were anticipated from the five leading exporters. Since these five countries had reported net exports of 544 million bushels to April 1, we anticipated a further export of 185 millions. "Whether as much as this will be exported," we stated, "depends largely upon the intensity of European demand, and upon the outlook for new crops. On the basis of present information we expect these figures to be approached but not exceeded." The actual reports are not yet available for the lesser countries, or for Canada for August. If, however, we accept Broomhall's figures for the lesser countries, and include Canada's exports from August 1, 1924, to July 31, 1925, we have the results shown in Table 3. Our advance estimates, in the aggregate, were in fact slightly exceeded; but since Canada's exports this August are unlikely to be as high as in August 1924, the comparable reported figure will probably be slightly below our suggested maximum.

Table 3. — Food Research Institute Advance Estimates of Net Exports for 1924–25 Compared with Reported Exports

(Million bushels)

Export area	Crop year ending July 31			Last 4 months	
	February estimate	April estimate	As reported	April estimate	As reported
United States	250[a]	260[a]	251.8[a]	43[c]	35.3[c]
Canada	175[b]	184[b]	191.9	57[d]	53.8[e]
Argentina	135	135	122.4	46	33.3
Australia	110	115	124.3	35	44.2
India	40	35	37.6	4	6.7
5 countries	710	729	728.0	185	173.3[e]
Other areas	15	20	22.4[f]		
Total	725	749	750.4		

[a] Crop year ending June 30.
[b] Estimates for year ending August 31.
[c] Last 3 months.
[d] Estimates for 5 months ending August 31.
[e] If the Canadian figure for August 1925 were included, as it was in the estimates, the Canadian figure would slightly exceed our advance estimate and the total for five countries would probably fall slightly short of our advance estimate.
[f] Broomhall's shipments.

It will be observed that net exports from the United States and Argentina fell slightly below our advance estimates, while Canadian, Australian, and British Indian exports exceeded them. The decline in the United States exports is readily explained by the

[1] Wheat Studies, April 1925, I, 168. His earlier forecast, maintained from November 18 to March 3, was 720 million bushels, much closer to the truth.

continued poor prospects for United States winter wheat, coupled with the fact (which chiefly explains the small total of exports in this period) that Europe's demand fell off in view of continued good prospects for new crops. The reduced shipments from Argentina have left her carryover larger than was anticipated, while the heavier Australian exports were made from a larger crop than we believed Australia had harvested.[1]

Since Canadian exports were probably slightly higher than our advance estimates, which were made on the assumption of a 1924 crop larger than the official estimate, we are still inclined to believe the official estimate will be revised upward. But our allowances for domestic milling and feed and waste may have been excessive.

Our present estimates of wheat supplies and disposition in the four principal exporting countries, for 1924–25 with comparisons, are given in Appendix Table XI. These are subject to further revision, and are at best only useful approximations.

The variations between our advance estimates of exports and the actual results seem within reasonable limits of error. The aggregate figure, however, is much closer to our suggested total than can be explained except as a coincidence. Nevertheless, the result tends to justify the mode of analysis we have pursued.

Imports Compared with Forecasts

Complete and definitive statistics for importing countries are not yet at hand. Broomhall's shipment figures for the 52 weeks ending August 1, however, show that only 640 million bushels were shipped to Europe, as compared with his March 3 forecast of 664 million, while shipments to countries outside of Europe are reported to have been 75 million bushels as compared with his March 3 forecast of 88 million and his earliest forecast of 112 million. While the year's shipments to Europe were the largest on record, and the total shipments were exceeded only in 1923–24, they fell considerably short of those which he anticipated from early March until mid-May.

The principal explanation for the decrease in general undoubtedly lies in the anticipation of good crops in importing countries and North Africa, which made it safe to reduce stocks to a low level prior to harvests. It is pertinent to add that whereas the harvests of 1924 were generally delayed in northern and western Europe, the crops of 1925 have been harvested promptly. Heavier imports would probably have been necessary had this year's harvests been late. Financial influences in certain countries were probably also a factor in restricting imports late in the crop year, especially in France and Italy; but it is difficult to assign any precise weight to this factor. Finally, the plane of substitution and retrenchment in consumption, which was raised in 1924–25 under the stress of limited domestic supplies and rising prices, probably reached its maximum in the closing months of the crop year. A leading British grain merchant writes, as of July 1, 1925: "None of us has reckoned sufficiently for the decrease in consumption owing to high prices, and the resulting economies. . . . Everybody is living from hand to mouth expecting good crops and lower prices. . . ."

Broomhall's detailed forecast by countries (March 3), and our own of April, compared with Broomhall's preliminary returns of early August, are given in Table 4. Germany, Poland, and Italy imported more than had been anticipated; France, the Baltic States, Russia, and European Turkey rather less. Our own advance estimates were closer than Broomhall's, in the aggregate and in the cases of Germany, France, and Poland; but not so close in the cases of Czecho-Slovakia and several smaller countries.

The large German imports are probably to be explained not so much by current requirements as by imports for the new year in anticipation of the tariff on grain and flour, which is about to go into effect. A similar influence probably operated to some degree in Italy and possibly in Czecho-Slovakia. The decrease in France is probably to be explained, in addition to the operation of economies in milling and consumption, by financial factors which

[1] The official figure is 164 million bushels, whereas in April we had accepted an estimate of 149.

have tended to restrict imports, and by expectations of early supplies from North Africa. The Polish, Russian, and Turkish imports are all peculiarly difficult to predict, and the preliminary returns for these countries are especially subject to error.

TABLE 4.—ADVANCE ESTIMATES OF WHEAT IMPORTS OF EUROPEAN COUNTRIES, 1924–25, COMPARED WITH BROOMHALL'S PRELIMINARY REPORT OF ACTUAL IMPORTS*

(Million bushels)

Country	Advance estimates: Food Res. Institute April	Advance estimates: Broomhall March 3	Preliminary returns Broomhall
Great Britain and Ireland	235	232	232
Italy	85	88	90
Germany	65	64	80
France	38	56	32
Belgium	38	40	40
Netherlands	27	24	24
Scandinavia	26	26	25
Switzerland	16	18	16
Austria	18	18	18
Czecho-Slovakia	24	26	26
Poland	6	—	11
Finland	5	16[a]	4
Spain and Portugal	4	4	7
Greece	20	20	21
Others	5	—	3
Total of above	612	632	629
Russia	24	24	16
Turkey in Europe	8	8	4
Grand total	644	664	649

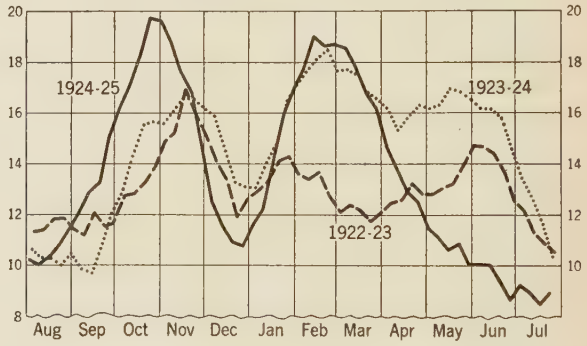
* See WHEAT STUDIES, April 1925, I, 151, and Broomhall's *Corn Trade News*, Aug. 4, 1925.
[a] Baltic States.

THE COURSE OF EXPORTS AND IMPORTS

The contrast between export shipments in 1924–25 and those of the two preceding years is shown graphically in Chart 4, which shows Broomhall's weekly shipments smoothed by a 5-weeks moving average. In the past year, shipments were exceptionally heavy in the fall, rather light at the turn of the year, and as heavy in February and March as in 1923–24; but they tended steadily downward from early March until late in June, and in the last three months of the crop year were far lower than in either of the two preceding years. There was no spring peak in 1925, as there usually is; North American surpluses had been largely shipped out earlier, and heavy shipments from the southern hemisphere had come early in response to high prices in the winter months. Weekly shipments of 10 million bushels or less, such as occurred in June and July, are rare except in August and September, and not very common in those months.

CHART 4.—WORLD WHEAT SHIPMENTS, WEEKLY, CROP YEARS 1922–23 TO 1924–25*

(Million bushels; 5-weeks moving average)



* Data from Broomhall's *Corn Trade News*

The flow of imports has been rather more uniform than the flow of exports, for the importing countries as a whole. But the detailed figures given in Appendix Table IX show numerous instances of sharp declines in May, June, or both, and complete figures will probably show sharper declines in July. Germany is almost the only large importer whose imports rose materially between March and June, and for this the prospective tariff was certainly partly responsible. In most other countries except Italy, the imports in the last half of the crop year promise to be materially below those of the first half.

REFLECTIONS ON IMPORTS OF 1924–25

When the European import figures are examined in connection with the 1924 crops, several facts to which we have previously called attention are exemplified.[1] It is clear that after a year of short crops, with high prices for wheat, imports have not been sufficient to make up for the crop

[1] See especially WHEAT STUDIES, December 1924, I, 32, 47; February 1925, I, 91, 93 f; and July 1925.

shortage except in a few countries. Generally speaking, European nations employed substitute foods and feeds, economized grain in various ways, drew upon stocks, and reduced consumption. The trade generally gave too little weight to the practical possibilities for reducing consumption. European consumption of wheat grain in 1924–25 was about the same as the low average of the four preceding years 1920–24, and far below the figure for 1923–24, when European crops were generally good and world wheat prices were abnormally low. Much the same was true of total bread grain consumption, including rye. An appreciable elasticity in wheat consumption in the presence of cereal substitutes is clearly indicated. It is also clear that, in general, this variability was most notable in countries which produce a large proportion of the wheat they use, and least considerable in the countries which import more than they produce.

An even greater elasticity is apparent from the sparse data for imports of countries outside of Europe. In 1923–24, under the stimulus of extremely low prices, ex-Europe imported very heavily. In 1924–25 much higher prices caused shipments to these countries (according to Broomhall) to fall to about half the figure for the preceding year.

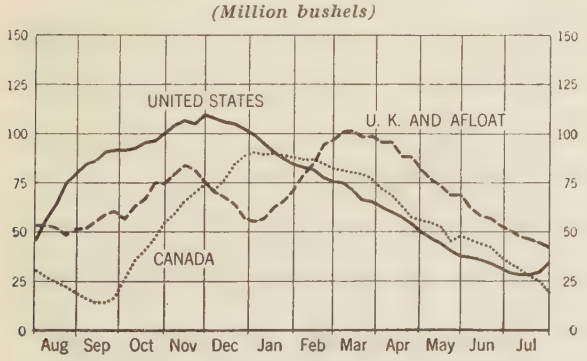
IV. SUPPLIES AT THE END OF THE CROP YEAR

The crop year 1924–25 opened with exceptionally large reserves of wheat in North America, and fair-sized stocks in other exporting and importing countries. Because of heavy marketing in the autumn and winter, visible supplies of wheat remained exceptionally high in most countries throughout much of the year. In North America, chiefly because of heavy exports and the small crop of 1924 in Canada, visible supplies reached their peak somewhat earlier than usual, and declined with few interruptions after January 1. Floating supplies were vastly increased in January and February, as a result of heavy shipments from the southern hemisphere. (See Chart 5.) From March to July, however, stocks of all sorts, central and country, visible and invisible, declined rather more rapidly than usual until new crop wheat was harvested

Broadly speaking, there is no doubt that the carryover of wheat into 1925–26 was much smaller than last year and somewhat smaller than two years ago; but it was not, on the whole, abnormally or dangerously low, as many observers expected it to be. This will be apparent from a consideration of the several available measures of elements in the carryover.

CHART 5.—VISIBLE WHEAT SUPPLIES IN UNITED STATES, CANADA, AND UNITED KINGDOM AND AFLOAT, WEEKLY, 1924–25*

(Million bushels)



* Data from *Bradstreet's, Canadian Grain Statistics,* and Broomhall's *Corn Trade News,* respectively.

WORLD VISIBLE SUPPLIES, AUGUST 1, 1925

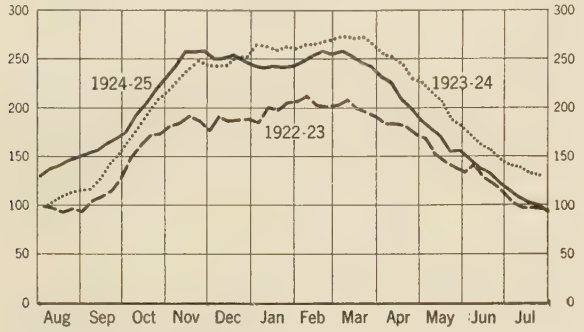
Comparable data for world visible supplies of wheat and flour on August 1, so far as they are gathered, are presented for several years in Appendix Table X. The principal items for the past six years are summarized below, in million bushels, in comparison with a pre-war and a post-war average:

August 1	Total	United States	Canada	U. K. and afloat
1910–14 ave.	119.1	58.8	10.8	50.6
1920–24 ave.	135.7	57.5	16.4	61.8
1920	139.9	42.7	8.2	89.0
1921	130.7	56.2	8.9	65.5
1922	118.5	43.1	19.3	56.0
1923	134.5	73.3	14.1	47.2
1924	155.4	72.1	31.6	51.7
1925	122.2	57.2	23.5	41.5

The figure for United Kingdom and afloat is unusually low, even by comparison with 1923, when good European crops were in prospect. The total is 33 million bushels lower than on August 1, 1924.[1] If one recog-

Chart 6.—Combined Visible Wheat Supplies in United States, Canada, and United Kingdom and Afloat, Weekly, Crop Years 1922–25*

(Million bushels)



* Sources as for Chart 5.

nizes that world visible supplies were exceptionally high last year, the recent total is not remarkably low. It is slightly higher than the pre-war average or the total for August 1, 1922,[2] and only 13½ million bushels below the average for 1920–24.

Chart 6 shows the weekly movement of the combined total visible supplies of United States *(Bradstreet's)*, Canadian, and United Kingdom and afloat—series not identical with those given in the table—in such a form as to render easy comparison of the past three crop years. During the period under discussion—April to July—the decline was steady and at approximately the same rate as in 1923–24. In spite of the complaints of a dull market, it is apparent that wheat was moving into consumers' hands at a rate probably better than normal.

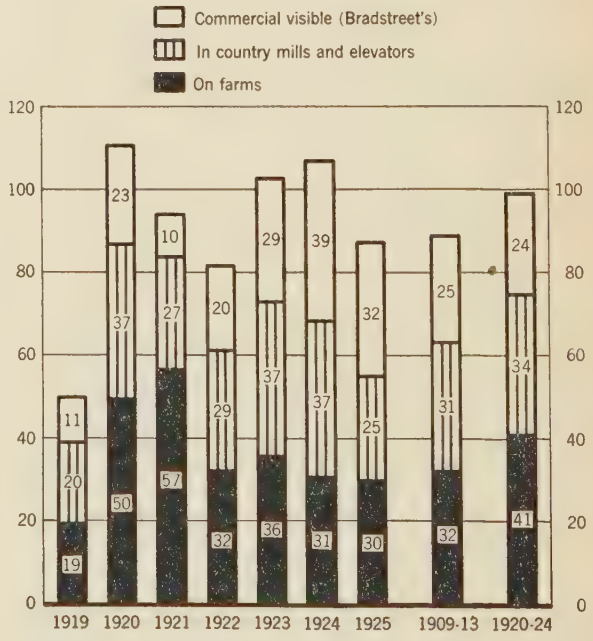
To complete the picture it is necessary to consider other stocks than visibles, and unreported supplies in the southern hemisphere and in Europe.

United States Stocks, July 1, 1925

The Department of Agriculture summary of wheat stocks in the United States, as of July 1, 1925, with comparisons, is shown graphically in Chart 7. The aggregate fig-

Chart 7.—Wheat Stocks in the United States, July 1, 1919–25, with Pre-War and Post-War Averages*

(Million bushels)



* Data of U. S. Department of Agriculture.

ure, 87 million bushels, is much the same as the pre-war average, but below the average for 1920–24, which included three high

[1] The United States Department of Agriculture issued early in July the following estimate of stocks of wheat in exporting countries and afloat on July 1, 1925, comparing this with similar estimates for the three preceding years:

July 1, 1922	236	million bu.
1923	269	" "
1924	305	" "
1925	230	" "

The estimate includes a rather heterogeneous group of items: namely, the United States carryover (consisting of country stocks as well as the visible), the Canadian visible, stocks "available for exports and carryover" in Argentina and Australia, the carryover in British India on April 1, and the wheat afloat the third week in June. Since the publication of this estimate the Department of Agriculture has increased its figure for the American carryover on July 1, 1925, by 7 million bushels. According to this compilation, the 1925 figure is the lowest in the four-year period but only very slightly under the 1922 total. Judging by other data, this estimate appears to overstate the reductions as compared with the carryovers of one and two years ago.

[2] The addition of Argentine and Australian visibles (see Appendix Table X) would increase the margin above the pre-war average, but this increase is partly due to increased port storage facilities in these countries.

figures. While country stocks were relatively low, in consequence of unusually heavy marketing, neither item appears extremely small, and visible supplies were larger than in any of the past six years except 1924. The combined figure of country stocks and visibles was 15 million bushels larger than our minimum estimate of last April, chiefly because milling and exports for April–June were somewhat below our suggested figures.

This year for the first time we have an estimate of stocks of city mills as of June 30, compiled by the Census Bureau. The total figures in million bushels, when adjusted for non-reporting mills, run as follows:

In country elevators	2.5
In other elevators and warehouses	3.9
In transit and in city mills	30.6
Total wheat	37.0
Flour, sold and unsold (as wheat)	17.5
Total wheat and flour	54.5

Excluding the first two items as included in country stocks or visibles, we have roughly 31 million bushels of wheat carried over but not heretofore included in reports of stocks. This is probably lower than the average for other post-war years, but not exceedingly small.

No comprehensive estimate of flour stocks is available. Russell's, the most comprehensive, and that of the *Daily Trade Bulletin,* which covers a smaller number of positions, agree in showing flour stocks much smaller on July 1 this year than on the same date in either of the two preceding years, but not markedly different from the post-war average. Probably most of the city-mill stocks of flour included in the tabulation above are not included even in Russell's estimate.

All told, the United States carryover of wheat and flour on July 1 was probably around 150 million bushels; undoubtedly much of this consisted of essential farm reserves and administrative stocks which tend to be larger when new crops are small.[1]

[1] See WHEAT STUDIES, March 1925, I, 124–126.

CANADIAN CARRYOVER, AUGUST 1

The official estimate of the Canadian wheat carryover on August 1, 1925, was 24.2 million bushels. (See Table 5.) This includes wheat in all positions—on farms, in elevators, in transit, and in flour mills—but it does not include flour. The corresponding figure for August 1, 1924, was 41 million bushels, but this, after a large crop and low prices, and in the face of a small new crop, was exceptionally high. Although exact comparisons with other years cannot be made, figures for September 1 in previous years suggest that this year's carryover appears small only by comparison with 1924. It is possible that stocks were not materially larger, if at all, on August 1, 1921 and 1923.

TABLE 5.—CANADIAN WHEAT CARRYOVERS, 1921–25*

(Thousand bushels)

Date	Total	On farms	In elevators	In transit	In flour mills
Sept. 1					
1921	13,727	2,144	4,831	6,032	720
1922	19,463	2,360	11,025	4,578	1,500
1923	11,750	1,441	5,051	2,758	2,500
1924	28,358	5,035	17,507	1,816	4,000
Aug. 1					
1924	41,119	[a]	[a]	[a]	[a]
1925	24,224	2,709	17,939	1,576	2,000

* Data from *Canada Year Books; Crops and Markets,* Sept. 27, 1924; and Dominion Bureau of Statistics press release, Aug. 15, 1925.

[a] Figures not available.

SOUTHERN HEMISPHERE SUPPLIES ON AUGUST 1

No official estimates of Argentine or Australian stocks are available for August 1. By deduction it appears, however, that Argentine supplies were perhaps slightly above normal on that date and Australian somewhat below the comparable figure for recent years. According to our approximations to the supply and disposition of wheat in the two countries during the past three crop years (see Appendix Table XI), Argentine supplies on August 1, 1925, may be estimated at 61 million bushels, as compared with 60 million last year (when output was large), 54 million in 1923, and 67

million in 1922. These stocks are larger than most observers anticipated, because Argentine exports declined heavily after April 1. Such a supply is sufficient to permit a substantial exportation before the new crop wheat becomes available early in 1926. Broomhall reports an exportable surplus of 24 million bushels, Sir James Wilson one of 40 millions. The exportable fraction included in our figure would lie between the two.

Australian supplies were probably not larger than 35 million bushels on August 1 of this year, as compared with 41 million bushels one year ago and an average of 38 million bushels for the three years 1922–24. The figure is higher than our April estimate, since, although exports April–July were higher than our suggested figure, the crop is officially reported as 15 million bushels above the figure we had used. Exportation from Australia was very heavy throughout the early months of 1925 and consequently it is to be assumed that exports will be small during the months intervening between now and harvest. Broomhall reports that the exportable surplus on August 1 was negligible. Our figures, on the basis of a past crop of 164 million bushels, lead one to expect a further export of 4 to 8 million bushels before next January.

European Stocks, August 1

Country stocks of old crop wheat in Europe were probably nearly exhausted on August 1. This was true of the countries of the Danube basin, which are normally exporters, as well as of European importing countries. Domestic crops had been small, and presumably had been pretty fully consumed. Commercial stocks were also presumably smaller than usual in most countries, because of the limited foreign purchases of recent months; but heavy imports into Germany and Italy, in anticipation of tariff levies, probably increased their reserves of import wheat. Stocks afloat and in the United Kingdom, although they had been very large earlier in the year, on August 1 were at the lowest point for this date since 1908. Comparable figures for these last items are shown in Appendix Table X.

All in all, the recent world carryover in exporting countries was not much below normal, though it was smaller than in either of the two preceding years. But in view of low stocks in Russia, the Danube basin, and most European importing countries, it is proper to assert that the world carryover into the crop year 1925–26 was unusually though not dangerously low.

V. THE CHANGING OUTLOOK FOR 1925 WHEAT CROPS

Between April 1 and August 1 the outlook for the northern hemisphere crops ordinarily becomes fairly definite, except for spring wheat and Russian wheat. Fall-sown crops are for the most part harvested by August 1. Spring-wheat crops have still to pass certain crucial stages, but are not far from harvest. Crop news is continuously important throughout this period, as indeed for six weeks more.

The first of the new wheat to reach overseas markets is that of British India. Her crop is usually harvested in February and March, and new grain may be expected to reach Europe in May or June. The next important crops to become available are those of northern Africa, southern Europe, and southern United States. These are cut in May and June, and begin to come to market shortly thereafter. By the end of July practically all of the fall-sown wheat in the United States is harvested, and in July and August most of the later European crops are ripe. The spring-wheat harvests of Canada and Russia are not completed until September, but the American spring-wheat crop and portions of the others are usually harvested in August.

Because of their early harvest, and the fact that their exports may fill in a gap between the heavy movements from the southern hemisphere and those of North America, the crops of British India and North Africa sometimes have a psychological importance in the market greater than the volume of their exports justifies.

For the international market, however, the crop developments in Europe and North America are of outstanding importance during April, May, June, and July. This year, since the current margin between wheat supplies and requirements was undeniably narrow, the changeable prospects for new crops have been watched with the keenest interest.

British India and North Africa

As early as April last it was recognized that British India would harvest a moderately small crop. A large acreage had been planted,[1] but drought did serious damage during the growing season, especially in the Punjab. The early official estimate of production (April 1925) was 322 million bushels, as compared with an average for the three preceding years of 368 million bushels and a pre-war average of 352 million. (See Table 6.) Certain observers considered the

Table 6.—British India's Wheat, 1920–25*

(Million bushels)

Year ending July 31	Crop	Net exports	Domestic utilization
1920–21	378	15	363
1921–22	250	(14)[a]	264
1922–23	367	29	338
1923–24	373	20	353
1924–25	364	38	326
5-year ave.	346	18	329
1925–26	325		

* Official data.
[a] Net imports.

early estimate too low, and on June 9 Broomhall reported a figure of 331 millions. But this estimate was never confirmed from official sources, and revisions brought the final estimate up to only 325 million bushels. Since British India's domestic utilization of wheat has averaged about 329 million bushels a year in the past five years, it has been safe to assume that, even at the higher level of wheat prices prevailing this year, little wheat could be expected from India during the crop year 1925–26.

The North African wheat crops consistently promised well, and turned out approximately as well as the good harvests of 1923. (See Table 7.) Egypt is normally an

Table 7.—North African Wheat Crops, Pre-War and Post-War*

(Million bushels)

Country	Average 1909–13	1920–24	1923	1924	1925
Morocco	17.0	19.6	20.0	23.9	21.1
Algeria	35.2	22.8	36.4	17.2	40.3
Tunis	6.2	6.9	9.9	5.2	8.7
Total exporters	58.4	49.3	66.3	46.3	70.1
Egypt	33.7	36.0	40.7	34.2	36.6
Total North Africa	92.1	85.3	107.0	80.5	106.7

* Official data.

importer, and with a crop of 36.6 million bushels is likely to import around 8 million bushels. Algeria, the principal exporter of the group, reports an excellent crop of 40.3 million bushels, and the three exporting countries together may have an export surplus of 12 to 15 million bushels, possibly more.[2] Already new crop wheat from Algeria has been shipped to France. Morocco's exports may be reduced because of military operations in connection with the Riff war.

United States Winter Wheat

The outlook for the American winter-wheat crop was distinctly unpromising last April, but it was then so early in the season that substantial improvement was still possible. No such improvement occurred; indeed, at no time during the growing season was the outlook good. In much of the winter-wheat area drought had prevailed during the autumn, and winter snows and spring rains proved insufficient to compensate for the earlier lack. Winter-killing was extremely heavy all over the belt, and especially severe in the Pacific Northwest. Out of a total planted area of 42.3 million acres, some 9.5 million acres were officially estimated as abandoned. The percentage abandoned was double the average, and the

[1] 32,057,000 acres as compared with 30,731,000 acres in 1923–24 and a five-year average, 1920–24, of 29,196,000 acres.

[2] Broomhall suggests a figure of 2 million quarters, Sir James Wilson only half as much.

highest recorded except in 1917. Spring droughts greatly aggravated the damage in the hard-wheat region from Nebraska south. East of the Mississippi the spring opened favorably, but in May and early June excessive heat and dry weather combined to cause deterioration. Consequently, in both the hard-winter and soft-winter wheat regions the yield promised and turned out to be decidedly subnormal.

The first forecast of the crop, on April 1, was 474 million bushels. Succeeding forecasts were 445, 407, and 404 millions. Threshing returns in July indicated a slightly higher output than had been anticipated on July 1; hence the official estimate of August 1 was 12 million bushels above the final forecast. The winter-wheat crop

TABLE 8.—OFFICIAL ESTIMATES OF CONDITION AND OUTPUT OF UNITED STATES WINTER WHEAT, 1925*

	Condition (per cent)					Production (million bushels)	
	Dec. 1	Apr. 1	May 1	June 1	July 1	Aug. 1, 1925	1920–24 average
United States	81.0	68.7	77.0	66.5	65.9	416	592
Pennsylvania	82	85	85	86	86	25	23
Ohio	80	61	62	54	59	26	35
Indiana	81	72	74	64	67	28	29
Illinois	87	87	85	68	68	39	47
Michigan	83	85	83	75	65	16	16
Missouri	85	86	89	76	79	31	35
Nebraska	78	66	77	64	63	30	51
Kansas	76	63	75	59	53	66	126
Texas	75	47	38	42	6.0[a]	4	19
Oklahoma	84	65	61	53	8.2[a]	25	45
Colorado	88	87	86	60	55	14	16
Idaho	82	74	81	90	—	—	9
Washington	77	28	76	80	82	10	29
Oregon	87	55	80	90	91	7	18

* Data of Department of Agriculture.
[a] Reported yield per acre.

Table 8 indicates the deterioration in leading states month by month, as shown by the condition figures of the Department of Agriculture, and also a comparison of the August 1 estimate of output for this year with an average of the final estimates for the past five years. The improvement shown in the government condition figures for May 1 was not altogether concurred in by unofficial observers. During that month the drought in the southwest was partially broken, but both Snow and the *Journal of Commerce* estimated deterioration in the crop as a whole, and neither Murray nor Cromwell showed a gain as large as the government. Leading experts substantially agreed that there was deterioration in the crop as a whole during May and June, although individual districts showed improvement.[1] But the method of expressing condition, in terms of a kind of "floating par," makes it somewhat difficult for even the trade to reason intelligently from the reported condition figures.

as a whole is now officially estimated at 416 million bushels, about 175 million bushels less than last year or the average of the past five years. The average yield per acre harvested is estimated at 12.7 bushels as compared with 15.6 bushels for the five years 1909–13 and 14.7 for the five years 1920–24.

In every important wheat-producing state except Pennsylvania—in the soft-wheat as well as the hard-wheat regions—the August 1 estimate of output for this year was lower than the average for the preceding five years. The loss is greater in the hard-wheat regions than in the soft, but all parts of the country have suffered the same misfortune.

[1] Unofficial estimates were as follows:

	April 1	May 1	June 1	July 1
Cromwell	74.1	76.0	—	—
Murray	73.0	75.6	69.3	64.5
Snow	75.0	71.6	71.0	64.9
Journal of Commerce	68.4	67.9	61.3	58.4

The approximate amounts of red winter, hard winter, and white wheats, as estimated in July by Brookmire's Agricultural Research Service, may be compared as follows with corresponding crops of the preceding three years:[1]

(Million bushels)

	1922	1923	1924	1925
Red winter	266	294	244	210
Hard winter	257	188	301	165
White	96	141	70	100

These estimates for 1925 would be slightly different on the basis of the August 1 estimate. It should be remarked that the white wheat includes some spring wheat, more than usual in 1925. Both the soft red winter and the hard winter crops are below the average domestic consumption of these wheats in recent years, which the Department of Agriculture estimates at 230 and 200 million bushels respectively.[2]

Fortunately, high quality partially compensates for the deficiency in volume. The wheat is practically all of high protein content and will make an excellent milling product.

Europe ex-Russia

Europe, outside of Russia, grows chiefly winter wheat. The area planted last fall was slightly larger than that of the previous year, and considerably larger than the postwar average in most of the wheat-producing countries. Reductions in wheat acreage were few and relatively slight. The winter proved generally favorable, and the acreage abandoned was small. In the United Kingdom, indeed, the fall was unfavorable and the winter excessively wet, but though the crop suffered there was little killing of the plant.

During the spring the weather improved prospects in Great Britain and was very favorable in all parts of the Continent, with sufficient moisture and temperatures not unduly high or low except for brief periods and in limited areas. By early June Broomhall was so confident of the promising developments that he stated that the outturn would be "much greater than last year." In the middle of the month he estimated the European and North African output of wheat and rye as 240 million bushels more than last year (in addition to an increase of equal amount from Russia).[3]

During July European crop conditions continued generally favorable, although in numerous scattered areas there were brief hot spells followed by violent storms or cold rainy weather. France, southern Poland, Roumania, and Bulgaria all reported serious local crop damage from these causes.[4] The southern European crops were harvested early in the month and, according to Broomhall, are of excellent quality. Central European crops are probably not of such good quality because of heavy rains at the time of harvest. The German wheat ripened prematurely and consequently may not be of first-rate quality. Northern Europe began to harvest at the end of July and also encountered rainy weather, which disappointed highest expectations as to yield and quality but did not reverse the good prospects.

Forecasts or early estimates of the wheat crops are now available for 15 countries, including all the large European producers except Jugo-Slavia. (See Table 9 and Appendix Table I.) The total for these countries is 1,094 million bushels, as compared with 915 millions for the same countries last year. These countries produced, in 1923 and on the average in 1920–24, about 87 per cent of the total European wheat crop, outside of Russia. The total production of the exporting countries seems likely to be about 280 million bushels, and that of the importing countries about 976 million bushels. The grand total would therefore be about 1,256 million bushels, approximately the same as the good crop of 1923 and 200 million bushels larger than that of 1924. Though 100 million bushels below the prewar average, it is 150 million bushels higher than the average for 1920–24.

The largest change as compared with the good harvests of 1923 is in the Spanish crop, which is reported 28 million bushels lower;

[1] Bulletin of July 25, 1925.

[2] Press release, Sept. 3, 1925.

[3] Late in June he amplified this by estimating this year's output of wheat in Europe (including Russia) and northern Africa as 280 million bushels greater than last year's, and of rye 200 million bushels greater.

[4] *New York Times*, Aug. 11, 1925.

but since Spain is practically self-sufficing, this change will not have a material influence on European import requirements.[1] The crops of the exporting countries of the Danube basin are apparently about 15 million bushels larger than in 1923, when the net exports were about 25 million bushels. Probably the export surplus will be somewhat larger than from the 1923 crop.

TABLE 9.—WHEAT AND RYE PRODUCTION IN EUROPE (EX-RUSSIA), 1925, WITH COMPARISONS*

(Million bushels)

Year	Wheat		Rye	
	15 countries	Total	12 countries	Total
1909–13 ave.	1,180	1,348	734	976
1920–24 ave.	965	1,105	515	696
1920	829	948	376	532
1921	1,068	1,216	557	757
1922	915	1,044	530	712
1923	1,100	1,261	631	827
1924	915	1,057	481	653
1925	1,098	1,256[a]	683	895[a]

* See Appendix Table I for sources and most details.
[a] Estimated.

The European rye crops this year are distinctly the best since the war. Germany and Poland, the two most important producers excepting Russia, both appear to have excellent crops, and in other parts of Europe reports are also favorable. From the twelve countries which have reported their probable output, a crop of 683 million bushels is expected this year as compared with 481 million last year and a 1920–24 average of 515 million. The total European crop, outside of Russia, is likely to be nearly 900 million bushels, as compared with 653 million last year and 827 million in 1923. (See Table 9 and Appendix Table II.) Good rye crops are almost as important to Europe as good wheat crops. In many countries rye is a primary foodstuff directly complementary to the wheat supply. Consequently, the promising condition of the rye crop has been and will be an important factor in limiting European demand for foreign wheat.

The early crop estimates, however, are always subject to error, and it is too early to state definitive totals for either wheat or rye. One reason for caution is that there is a tendency to overestimate good crops. Another is that harvest weather has been unfavorable in some sections since the estimates were prepared. Present indications, however, are that the final estimates will not be materially below the preliminary official figures used above.

RUSSIA

The Russian situation has been exceedingly difficult to adjudge, both because experience has shown that official reports are not altogether trustworthy, and because conditions have changed radically during the growing season. The fall and winter were distinctly unfavorable to fall-sown wheat and rye. The winter-wheat acreage was slightly increased, but this was more than counterbalanced by a decrease in acreage of winter rye. Much seed failed to germinate, and devastations by insects, by drought, and by freezing for lack of adequate snow-cover, were serious. As in North America, however, the spring was favorable. As early as April 21, Broomhall reported that it was "practically established that injury sustained by the winter crops through drought and frost was not so serious as feared. Nevertheless winter-killing has been more extensive than usual, being estimated at 8 to 10 per cent of the total seeded acreage."[2] Special measures were taken to insure extensive distribution of seed grain, with which to reseed abandoned areas as well as for customary spring planting, and spring sowings were reported unusually large.

The Soviet government has issued regular detailed reports on the condition of the crops in various parts of the country during the growing season.[3] These indicate considerably better wheat and rye crops than those of last year and show consistent improvement in condition from May 1 to July 1. According to the condition-reporting system in use in Russia, in which 1 represents very bad conditions, 5 excellent, and 3

[1] Grain experts are said to estimate the crop at 150 million bushels, 22 million bushels above the latest official estimate.

[2] On May 12 Broomhall quoted the International Institute as reporting fall sowings, exclusive of Turkestan, Trans-Caucasia, and the Far East, as 12.9 million acres in wheat and 64.7 million acres in rye.

[3] See London *Economist*, Aug. 8, 1925, and file of *Ekonomitcheskaya Zhizu*.

medium, the July 1 condition of all cereals in the federated Soviet republics was 3.3 this year as compared with 2.5 in 1924. Conditions were most favorable in the North Caucasus, but good also in the Ukraine and Kirghiz, and really bad only in small areas of the Central Governments. Earlier reports anticipated a crop comparable in size with that of 1923; but with the improvement in the later growing season, a considerably larger output has been expected for several months.

By the middle of June Broomhall counted upon a Russian crop of breadgrains 240 million bushels higher than last year's. Later in the month he reported an estimate by the Export Commissariat that Russia would have 60 million bushels of wheat and 40 million bushels of rye for export, presumably in addition to larger quantities for domestic consumption than last year, when Russia was a net importer of breadgrains. In July the United States Department of Agriculture reported Russian estimates that Russia would have a surplus of approximately 255 million bushels of breadgrains for export during the coming year.[1]

The official estimate of the Central Statistical Bureau as of August 1 puts the wheat crop at the extraordinary total of 664 million bushels, double the crop of 1924, and the rye crop at 768 million bushels, as compared with 750 million bushels in 1923 and 624 million bushels in 1924.[2] This would mean total breadgrain crops 476 million bushels larger than those of 1924, and 352 million bushels above those of 1923. It is doubtful whether the harvests will prove as large as these optimistic estimates, but there is general agreement that Russian crops are by far the best since the war.

As Broomhall has pointed out, Russian grain has a way of "disappearing" before it reaches points of embarkation. The condition of the distributive system, the railways, and the waterways, is such as to limit exports. Consequently, even though the surplus may be as large as estimated, by no means all of it will reach international markets.[3] As early as July, however, Russia was reported an active seller of wheat, and attractive prices will prove a considerable stimulus to exports. The Soviet government may be counted upon to promote large exports to the best of its ability.

While it is too early to reach final conclusions, especially in view of the large proportion of spring-sown grain, all observers agree in anticipating a substantial export of wheat and rye from Russia during the coming year. The Russian surplus promises to be relatively more important as a factor in the international wheat market than in any year since the war, and the uncertainty concerning its size will probably be an unsettling factor for several months.

North American Spring-Wheat Crops

The spring of 1925 was unusually favorable for the sowing of spring wheat in North America. Moisture supplies were ample, the season was early, and frosts were only a moderate handicap. In Canada less than the usual amount of fall plowing had been possible, and the acreage was much the same as in 1924 in spite of good weather and the price stimulus. In the typical spring-wheat states south of the border there was some increase of acreage, chiefly of durum wheat. But in Oregon, Washington, and Idaho, where fall-sown wheat had been heavily killed, large areas were reseeded, notably with Hard Federation wheat distributed with public and private assistance. This was accomplished with unusual success because of favorable weather conditions. The total spring-wheat acreage in this country is reported as 21.2 million acres, $3\frac{1}{2}$ million larger than in 1924.

In the United States the June 1 condition report was not highly favorable, but that of July 1 was exceptionally high. (See Appendix Table III.) Conditions continued favorable until the second week of July, when excessive heat and high winds prevailed in many areas for a week or ten days. Normal temperatures and some rainfall followed during the rest of the month, but did not fully repair the damage. In the Pacific

[1] See *Foreign Crops and Markets*, July 13, 1925, p. 48.
[2] Broomhall's *Corn Trade News*, Aug. 25, 1925.
[3] Broomhall and Sir James Wilson, early in August, counted on only 40 million bushels of wheat from Russia; but since the publication of the recent estimate Broomhall evidently thinks a much larger export probable.

Northwest, especially, high expectations suffered a rude shock. The August 1 condition report was, therefore, below average. The successive forecasts of the total spring-wheat crop, shown in Table 10, have been 254 million bushels on June 1, 276 million on July 1, and 263 million on August 1, as compared with 283 million bushels harvested in 1924. The September 1 estimate, however, raised the figure by 21 million bushels to 284, practically equal to the good crop of 1924. Further substantial revision is still possible.[1]

TABLE 10.—OFFICIAL FORECASTS OF UNITED STATES SPRING-WHEAT CROP BY STATES, 1925

(Million bushels)

State	June 1	July 1	Aug. 1
Minnesota	23.3	24.4	22.8
North Dakota	95.1	103.9	102.1
South Dakota	22.0	27.1	27.2
Montana	39.1	44.0	35.3
Idaho	17.9	18.4	18.4
Washington	28.6	28.5	26.4
Total crop	253.7	275.7	262.7

Threshing began in the southern sections late in July, and disclosed a wide range in yield and in quality. Some injury was caused by rust, but the major damage was due to heat. Very low yields were obtained in the districts where the heat was most severe. Durum wheat came through the season much better than bread wheats. The latter are apparently stronger in protein content than last year's crop, but are especially variable in weight per bushel.

In Canada conditions were exceedingly favorable until June, and some serious observers looked forward to a crop of perhaps 500 million bushels. In July, however, weather conditions were quite unfavorable in Alberta and Saskatchewan, and hopes of a bumper yield came to be discounted. The first official forecast for spring wheat, as of May 31, was 348 million bushels; the June 30 forecast for all wheat was 365 millions, that of July 31 was 375 millions, and that of August 31 was 392 millions. Trade opinion considered the first two forecasts unduly conservative, but later expected reductions rather than increases, in consequence of the weather in July and August, and regarded the estimates as misleading indexes of the developing conditions. The June 30 and July 31 forecasts were fairly close to the corresponding ones in 1923, when continuing favorable conditions led to the harvesting of a crop finally estimated at 455 million bushels. But the August 31 forecast has usually been within 10 million bushels of the final estimate as of December 31.[2]

[1] Last year the final estimate of December 1 was 58 million bushels higher than the forecast of August 1, and 46 million bushels higher than the estimate of September 1; such improvement, however, is quite unusual.

[2] See Appendix Table IV.

NORTHERN HEMISPHERE CROP POSITION

The crop position of the northern hemisphere may now be summarized briefly. British India has harvested a crop which will about cover normal domestic requirements. The United States winter-wheat crop is apparently about 175 million bushels below that of 1924 or the average of the past five years. The spring-wheat crops of North America are very good, but the Canadian crop falls some 80 million bushels below the 1923 record, and the United States spring-wheat crop is about as large as the good crop of 1924. The North Africa crops are good, of much the same size as in 1923, and some 27 million bushels better than in 1924. Europe bids fair to have a wheat crop about as large as in 1923, around 200 million bushels greater than that of 1924. European rye crops are even better, probably 240 million bushels larger than in 1924. The Russian wheat crop is reported twice as large as last year,—an increase of well over 300 million bushels; and the rye crop is also the best since the Revolution.

Table 11 gives summary estimates for the northern hemisphere wheat crops of 1925, outside of Russia, with comparable data for earlier years. On the basis of information to September 10, 1925, these crops promise to be the best since the war except in 1923. Our preliminary totals are 155 million bushels larger than the poor crop of 1924, about 220 million bushels smaller than the excellent yield of 1923, and 55 million bushels above the average of the past five years. If European crops of rye are taken into account, the comparison

with 1924 and with the average for 1920–24 is improved, but even so the totals fall short of the excellent world harvests of 1923. If, however, the Russian wheat crop should turn out as large as the huge estimate of August 1, the northern hemisphere crops including Russia will be the largest since 1915.

TABLE 11.—NORTHERN HEMISPHERE WHEAT CROPS, EX-RUSSIA, PRE-WAR AND POST-WAR*

(Million bushels)

Year	British India	United States Winter	United States Spring	Canada	North Africa	Europe Exporters	Europe Importers	Japanese Empire	Total ex-Russia [a]
1909–13 ave.	352	441	249	197	92	330	1,018	32	2,711
1920–24 ave.	346	592	245	340	85	218	887	39	2,773
1920	378	611	222	263	63	173	775	41	2,526
1921	250	600	215	301	106	212	1,004	39	2,727
1922	367	587	281	400	70	229	815	40	2,789
1923	373	572	225	474	107	267	994	37	3,049
1924	364	590	283	262	80	208	849	36	2,672
1925	325	416	284	392	107	280[b]	976[b]	47	2,827[b]

* See Appendix Table I for sources and greater details.
[a] Excluding also Mexico, Turkey, and a few very small producers.
[b] Including approximations for non-reporting countries.

VI. THE NEW CROP YEAR

We are now in a position to consider some aspects of the trade and price outlook for the crop year 1925–26.

Certain facts seem established. The carryover of old wheat into the new crop year was little below normal size in the leading exporting countries as a whole, though considerably smaller than a year or two years ago. In most importing countries, as well as in the exporting countries of the Danube basin, on the other hand, carryovers were apparently reduced to very small dimensions. The total world carryover of wheat was substantially lower than last year, indeed abnormally small. Northern hemisphere wheat crops, outside of Russia, now appear to be the largest since the war, except in 1923, and 155 million bushels larger than in 1924. Russian crops of both wheat and rye are the best since the war, and, if the August 1 forecast is correct, over 400 million bushels larger than last year. Wheat crops of European importing countries are about 127 million bushels larger than in 1924, and those of exporting countries (ex-Russia) about 72 million bushels larger than last year. European rye crops, outside of Russia, are substantially larger than even the good harvests of 1923, and perhaps 240 million bushels larger than in 1924. No useful forecast of southern hemisphere crops can be made; but it is noteworthy that Argentina is reported to have planted a record wheat area of 18.8 million acres, as compared with 17.8 millions in 1924, and that Australia has planted a large acreage. In both countries early conditions have been favorable.

From an international viewpoint, it is safe to say that abundant supplies of rye are in sight, and that the threat of stringency in the wheat market caused by the shortage of American winter wheat has been dissipated by favorable developments in Europe, Soviet Russia, and the North American spring-wheat belt. The world wheat position in 1925–26, while quite unlikely to be as easy as in 1923–24, does not promise the tightness which developed in 1924–25 and which, earlier in the season, was expected to continue in the current crop year. But concerning Russian crops and exports, which loom up as a major factor this year, uncertainty will reign for some time to come.

IMPORTERS' REQUIREMENTS

Broomhall's preliminary forecast of import requirements of importing countries for 1925–26 is 602 million bushels, includ-

ing 506 for European importers and 96 for importers outside of Europe. Sir James Wilson's corresponding estimates are 640, 520, and 120 million bushels respectively. Table 12 shows the details of these two

TABLE 12.—TWO PRELIMINARY FORECASTS OF EUROPEAN WHEAT IMPORTS COMPARED WITH BROOMHALL'S PRELIMINARY RETURNS FOR 1924–25 AND OFFICIAL DATA FOR NET IMPORTS FOR 1920–24 AND 1923–24*

(Million bushels)

Country	1920–24 average official	1923–24 official	1924–25 prelim. returns	1925–26 forecasts Broomhall	1925–26 forecasts Wilson
United Kingdom	214.2	241.4	232.0	224.0	232
France	46.0	53.0	32.0	24.0	16
Germany	49.4	30.9	80.0	40.0	56
Italy	96.4	69.8	90.0	56.0	32
Belgium	38.1	40.3	40.0	38.0	40
Netherlands	22.3	26.7	24.0	20.0	24
Switzerland	15.0	17.1	16.0	16.0	16
Spain	9.2[c]	[b]	7.2	8.0	8
Portugal	4.0	2.0			
Denmark	5.0	9.2	7.6	6.0	8
Sweden	7.9	12.4	11.6	8.0	12
Norway	5.5	6.1	6.0	6.0	4
Austria	16.3	18.2	17.6	16.0	16
Czecho-Slovakia	15.4	21.2	26.0	16.0	24
Greece	15.1	18.8	20.8	16.0	20
Poland	1.7[c]	1.4[d]	10.8	—	—
Latvia	1.0	1.5[d]	2.0	1.6[e]	12
Finland	4.0	5.1	4.4	4.0	
Turkey	5.7[f]	3.4[g]	4.0	4.0	
Others	1.6[f,h]	1.6[g,h]	.8[i]	2.0[j]	
Total Europe (ex-Russia)	573.8	580.1	632.8	505.6	520

* For sources, see WHEAT STUDIES, December 1924, I, 55; Broomhall's *Corn Trade News*, Aug. 4, 1925; and supplement to *Corn Trade News*, Aug. 18, 1925.

[a] Average for 1920–23.

[b] No figures available. Spain was a net exporter to a small extent.

[c] Average 1921–24.

[d] Ten months only.

[e] Latvia and Esthonia.

[f] Calendar years 1920–23.

[g] Calendar year 1923.

[h] Malta.

[i] Esthonia.

[j] Malta and Gibraltar.

forecasts for European importers in comparison with Broomhall's statement of preliminary returns for 1924–25 and official figures for 1923–24 and the four-year average 1920–24. It will be observed that Broomhall anticipates not merely a reduction from 1924–25 of 127 million bushels in aggregate net import requirements (excluding Russia), but a reduction of about 75 million bushels from 1923–24 (or 1922–23). On the basis of present crop estimates, a net import of 506 million bushels of wheat would give these countries about the same supplies of wheat (disregarding carryovers) as in 1924–25, but about 90 million bushels less than in 1923–24.[1]

There is little doubt that the net imports of European importers will be smaller in 1925–26 than in 1924–25, because the 1925 wheat and rye crops of the importing countries are so much larger this year. It is rash to assume, however, that net imports of wheat will be reduced to the full extent of the increase in wheat crops, especially since carryovers are so much smaller than a year ago. Past experience shows that in years of small crops in importing countries (as in 1924–25), imports are not increased enough to compensate for crop deficiencies, but consumption is reduced, particularly in countries which produce a large fraction of their supplies; whereas in years of large crops in importing countries (as in 1923–24), consumption there is enlarged.[2] Already France has lowered the minimum rate of extraction and relaxed her requirements for mixing other grains with wheat in milling;[3] and most of the special restrictions in force in 1924–25 are likely to be abolished.

The excellent crops of rye, however, will tend to reduce demands for wheat, to a degree not generally appreciated. It is important to add that European crops of maize and potatoes also promise well this year, and that if world conditions make for high prices of wheat, consumption of wheat for food and feed will be restricted in favor of substitutes.

The price factor bids fair to restrict imports in 1925–26, at least by contrast with 1923–24. Even if the level should be lower than that which now prevails, it seems certain to remain substantially higher than in

[1] Excluding Luxemburg, Lithuania, Esthonia, Turkey, and Malta, we have the following in million bushels:

	1923–24	1924–25	1925–26
Crop of importing countries (Table 11, p. 349)	990	845	976 est.
Net imports	575	628	500 est.
Total supplies	1,569	1,473	1,476 est.

[2] See WHEAT STUDIES, July 1925, I, No. 7.

[3] From August 20 flour is required to contain 96 per cent of wheat flour and 4 per cent of rye flour. Last year an 8 per cent admixture of non-wheat material was required.

1922–23 or 1923–24, or even in the first part of the crop year 1924–25. It must not be forgotten that Europe's heavy purchases of wheat in 1923–24 were largely due to prevailing low prices, and that much of Europe's wheat imports in 1924–25 were bought in the summer and early autumn of 1924, before prices had risen to the level which prevailed after December. Nevertheless, it is doubtful whether the prospective price influence alone could cause importing Europe to reduce its wheat consumption below that of 1923–24 by as much as 90 million bushels.

Tariff influences may operate to restrict importations in certain countries. Germany recently (August 12) enacted a tariff law designed to protect agricultural interests among others. Substantial duties on wheat, rye, and flour go into effect September 1. Some competent observers expect these duties to have little effect, in the long run, on Germany's wheat imports, because of the impossibility of radical expansion of agricultural production within Germany. If enforced, however, the duties will probably raise prices and thereby reduce consumption and imports. Also, the heavier imports of recent months, made in anticipation of the tariff, may help to restrict the import requirements of 1925–26. The Italian government has reimposed, from July 24, the high duties established by the tariff of 1921. If these duties are enforced, wheat consumption may be materially reduced in favor of various substitutes. France also, on July 15, reimposed the import duties suspended during the preceding year of shortage, but these do not affect imports from North Africa and seem unlikely to affect total French imports to any large degree. Czecho-Slovakia has established a sliding scale of duties on wheat and flour; but at the present level of prices the tariff will not become effective, and its influence in 1925–26 can hardly be important.[1]

[1] The following table shows the scale of duties effective in Germany, France, and Italy, expressed in American currency (counting the French franc at 5 cents):

Country	Date effective	Wheat *(per bu.)*	Flour *(per bbl.)*	Rye *(per bu.)*
Germany	Sept. 1, 1925	$0.227	$1.80	$0.181
France	July 15, 1925	.191	.98	
Italy	July 24, 1925	.394	1.97	.221

Against these influences tending to reduce imports, there are a few partially counterbalancing factors. Prices of cattle, hogs, meats, and other animal products are considerably higher this year than one and two years ago. In some measure dearness may reduce consumption of these products and make for increased consumption of breadstuffs. Moreover, while Europe has not regained normal equilibrium or prosperity, it seems probable that financial difficulties, such as reduced Germany's wheat imports to small proportions in 1922–23 and 1923–24, will not operate in 1925–26 in the case of any large importer, and that bread rations will not be materially restricted by poverty, as has been true in several areas in the past few years.

Probably a more important factor to consider in connection with import requirements for 1925–26 is the fact that carryovers in the continental European countries, exporters and importers alike, were generally very low on August 1, if we may trust non-statistical evidence. An appreciable proportion of this year's crops and imports may be expected to be used to replenish stocks, except in the cases of Germany, and possibly Italy and Czecho-Slovakia as well.

In the light of these various influences, so far as they can be appraised at present, Broomhall's estimate of aggregate European import requirements appears conservative, and perhaps Sir James Wilson's higher estimate as well. But much will depend upon world wheat prices, and particularly upon exports from Canada and Russia. Should import prices decline considerably, and next year's crops promise badly, European imports may exceed Broomhall's suggested figure by considerable amounts.

Broomhall's estimate of 96 million bushels for ex-European importers seems a little high, on his basis of estimate, and Sir James Wilson's even further above the truth, especially since Japanese crops are reported 11 million bushels higher than last year. If prices should remain not far from their present levels, these countries seem to us unlikely to take much more than in the past year. Substantial increases are unlikely un-

less world prices should decline materially. Definite figures, however, are difficult to reach because of deficient statistics.

The aggregate wheat-import requirements of importing countries now seem likely to be somewhat over 600 million bushels, but not as high as 650 millions.

Export Surpluses

Against importers' requirements of some 600 million bushels, Broomhall sets a preliminary rough estimate of 752 million bushels as "exporters' available surpluses,"[1] and Sir James Wilson arrives at a figure of 720 millions.[2] The details compare as follows, in million bushels:

	Broomhall	Wilson
United States	80	48
Canada	280	256
North Africa	16	8
Danube basin	64	56
Russia	40	40
Argentina	184	192
Australia	80	88
Chile	—	8
British India	8	24
Total	752	720

Since both estimates were prepared, the official forecast of the Canadian crop has been increased by 27 million bushels, that of the American spring-wheat crop has been raised 8 million bushels, and the large Russian estimate has appeared. For both experts, however, the category of "available surpluses" is much broader than "probable exports" and covers more than could ordinarily be exported. Thus Broomhall's North American items allow little for feed uses, and both Argentine items include carryover in but do not deduct carryover out. Figures for Argentina, Australia, and British India are based on assumptions regarding the next harvests. The estimate for Russia is avowedly conservative, but that for the Danube basin gives little weight to forces which will restrict actual exports. Since the Russian spring-wheat crop is not yet determinate, since Russian exports are impossible to predict, and since the southern hemisphere crops are only in their early stages, it is premature to criticise the figures in detail or to prepare, at this time, any careful forecast of probable exports.[3] In view, however, of carryovers in exporting countries and of present indications regarding Russian crops, there appears to be a larger margin between genuine export surpluses and probable import requirements than was true in 1924–25, although the above tabulations give an exaggerated impression of the size of this margin.

As we have frequently had occasion to emphasize, the margin between genuine exportable surpluses and importers' effective requirements is far more important in the wheat market than changes in the size of world crops as a whole. Because of the different distribution of the 1925 crops, the adjustment promises to be less close than a comparison of the past two crops and initial carryovers would suggest. The world wheat position as a whole now seems to us likely to prove distinctly less tight in 1925–26 than it was in 1924–25.

The United States Outlook

The same cannot be said of the United States. The wheat position of this country in the crop year 1925–26 will be quite peculiar. The winter-wheat crop is one of the smallest in many years, ranking with the poor crops of 1910–12 and 1917. The prospective total crop is smaller than any since the two poor crops of 1916 and 1917. Our requirements have been increasing, and if domestic utilization should be as heavy in 1925–26 as in 1923–24 (estimated at 663 million bushels), the crops of 1925 (estimated at 700 million bushels) would provide very little net export. In fact, the adjustment will probably not be so close, but the margin available for export is sufficiently narrow to justify a careful analysis of the situation and some attempt to consider its effects upon prices and international trade.

[1] Broomhall's *Corn Trade News*, Aug. 4, 18, 1925.
[2] *Ibid.*, supplement, Aug. 18, 1925.
[3] Broomhall's first estimate of probable exports is as follows, in million bushels:

United States	64	India	1.6
Canada	240	Danube basin	48
Argentina	128	No. Africa and Chile	16
Australia	64		
Russia	40	Total	601.6

Domestic Requirements

One approach to the problem lies through estimates of domestic requirements, for seed, flour, and feed. For each of these it is possible to suggest maximum and minimum limits.

Seed use may be estimated at 90–95 million bushels. The official estimate for seed sown for the 1925 crops is 88 million bushels. Reports from farmers to the Department of Agriculture indicate intended plantings of winter wheat as 9.7 per cent above the acreage sown last autumn. If these intentions are realized, the seed requirements for winter wheat are likely to be larger by 5½ million bushels than in the past year. On the other hand, the spring-wheat acreage in 1925 was abnormally increased in consequence of the heavy abandonment of winter-wheat acreage. A range of 90–95 million bushels seems sufficient to allow for prospective changes in acreage of all wheat.

The wheat milled into flour for domestic consumption seems likely to range from 485 to 510 million bushels. The lower figure is based upon the estimated flour production of the crop year 1924–25, according to the monthly milling census (without adjustment for customs mills and for merchant mills producing less than 5,000 barrels a year, with deduction of net exports). The 103.8 million barrels of flour are converted to wheat at 4.58 bushels to the barrel, according to the average ratio reported by the Census Bureau for 1924–25, and a conservative allowance of 2 per cent is added for smaller mills. The higher figure is calculated in the same fashion from the milling census for 1923–24, and gives 106.8 million barrels, or 494 million bushels, but to this is added a slightly larger allowance of 16 million bushels to cover smaller mills. In view of the increase in population, the actual results would seem likely to be nearer to the higher figure than to the lower one.

Feed uses are impossible to estimate at all closely. As a minimum figure we may take the average farm use for the years 1917–19, as estimated by the United States Grain Corporation—20 million bushels—plus an arbitrary allowance of 10 million bushels to represent dockage used for animal feed. As a maximum, we may take 8.1 per cent of the crop (reported to the Department of Agriculture on November 1923 as the usual proportion fed on farms), plus the arbitrary figure of 10 million bushels for dockage. With good feed crops in prospect, less than the usual feeding of wheat may be expected. This would give a range of 30 to 65 million bushels for feed and waste.

Summarizing, we have a range for domestic requirements of from 605 to 670 million bushels, as follows:[1]

Seed	90– 95
Food	485–510
Feed	30– 65
Total	605–670

The higher limit was closely approached in 1923–24, when seed requirements were less than 80 million bushels and wheat prices were so low, both absolutely and in relation to other feed prices, that exceptionally large amounts were fed to animals. The lower limit is high only by contrast with 1921–22, when the working down of flour inventories made possible exceptionally low milling for domestic uses. The lower figure would allow a net export of about 95 million bushels, the higher about 30 million. Since the carryover into 1925–26 was little below average, possibly 10 or 20 million bushels might be drawn from this to add to these figures for exports, provided there were a sufficient motive; but except in the face of a heavy export demand next spring the carryover is as likely to be increased as to be reduced.

Classes of Exports

Another approach may be made through considering the character of America's wheat exports. These consist, as we have previously shown,[2] of several distinct fractions: (1) representative milling wheats; (2) durum wheat, which is grown to a con-

[1] The Department of Agriculture, in a press release dated Sept. 3, 1925, stated: "The actual feed, seed, and wheat flour consumption of the present population of the United States may vary from 600,000,000 to 675,000,000 bushels."

[2] Wheat Studies, March 1925, I, 126–131.

siderable extent for export; (3) Pacific wheats, which can move to eastern markets only under a heavy handicap of freight charges; (4) high-grade flour made from representative wheats or better; and (5) low-grade flours, largely a by-product of the milling of high-grade flour for the home trade. The export of representative milling wheats is the most variable, since there are forces at work to maintain exports of each of the other classes.

Durum wheat is used in this country chiefly in the manufacture of macaroni, and only slightly for mixing with other spring wheats for milling domestic flour. Out of a prospective crop of 60–70 million bushels or more, of high quality, 30 million bushels will presumably cover normal domestic uses, though we expect price differences to operate in favor of a maximum use of durum wheat for flour milling. This would leave 30 million bushels or more to pass into export, in competition with similar wheat from North Africa and Russia. This competition bids fair to be severe.

The Pacific region crop may be provisionally estimated at 120 million bushels—a large crop, though much smaller than early reports suggested.[1] Of this perhaps 10 million bushels will be used for seed. Pacific region uses for food and feed may be liberally estimated at 60–70 million bushels including perhaps 10–20 million bushels of hard wheats shipped westward over the mountains for blending purposes. Since the crop of 1924 was short and carryovers out were small, a substantial amount may be retained as a carryover next July. In quality the crop is above average, particularly in protein content. Since such white wheat can be blended with other wheats in manufacturing the standard flours of the Mississippi Valley or the East, some of it will doubtless move eastward in spite of heavy freight charges.[2] Small quantities of Pacific Coast flour will also move eastward by rail and water, as usual. These movements will be at least partially counterbalanced by somewhat less than the usual westward movements of hard wheats, chiefly from Kansas and Montana, and of strong flours.

The extent to which Pacific wheat will be sought by central millers will depend largely on the price. It is a question of the c.i.f. price, let us say, of Washington wheat at central points from Minneapolis to St. Louis, in comparison with c.i.f. price of Canadian spring wheat duty-paid, the existing price difference to be judged in the light of the superiority of the Canadian wheat for the manufacture of bakery flour. The outcome will be a matter of trial and error, for which we possess practically no milling precedents.

Insofar as the surplus of Pacific region wheat does not go east, it will necessarily have to seek foreign markets at the world price, quality and type considered. The low-grade Pacific flours go naturally to the Orient; both low- and high-grade Pacific flours go to European markets. It is not unreasonable to imagine that, with due allowance for Pacific Coast uses and shipments eastward, at least 30 million bushels of the crop of that region will pass into export, as grain or flour. Even from the much smaller crops of 1922 and 1924, exports were 40 and 28 million bushels respectively, while from the large crop of 1923 (142 million bushels) 68 million were exported.

Flour exports from other milling regions are also certain to continue, despite a dearth of domestic wheat. American mills are very desirous of keeping their high-grade flours in foreign markets in order to continue trademark prestige and maintain their reputations as international vendors of flour. They will import Canadian wheat and grind it (in bond or with drawback) for export as American flour, unless this should be prevented by a Canadian export tax, as has been suggested in a recent report of the Grain Inquiry Commission and urged by Canadian milling interests. Such milling of Canadian wheat for flour export may run as high as 5 million barrels, representing some 23 million bushels of wheat.

Furthermore, clears and other low-grade flours, produced like mill-feed as a by-

[1] Including Idaho, Utah, Nevada, and Arizona, as well as the coastal states; and considerable spring wheat replacing winter-killed grain.

[2] According to information from trade sources, some Pacific wheat has already reached Mississippi Valley markets.

product of the routine operations of American mills, find little domestic sale and must be exported. Even in the face of a large price differential, Americans are unlikely materially to increase their consumption of low-grade flours. Nor are American mills likely to resort to a higher milling extraction, as was done during the war, except insofar as high quality of the crop permits comparable flour to be milled with higher extraction. Exports of these low-grade flours may perhaps run as high as 3½ million barrels, exclusive of those from the Pacific Coast—or say 16 million bushels of wheat.

Finally, we must anticipate the export of small quantities of soft red winter wheat and low-grade hard winter wheat, especially early in the crop year.

The foregoing considerations afford no basis for precise predictions. Clearly, however, it should occasion no surprise if our "incidental" exports of wheat and flour, of the above classes, were to reach 100 million bushels. If domestic requirements reach 640 million bushels and the crop proves no larger than the September 1 estimate, these exports would leave a deficiency that could be met only by substantial imports from Canada for domestic consumption, over the duty, in addition to Canadian wheat imported to be milled in bond for export. So far as representative wheats are concerned, the United States seems certain to be on a domestic basis rather than an export basis for most of the crop year 1925–26. Gross exports of wheat and flour may exceed 100 million bushels, but net exports seem unlikely to exceed 75 million bushels and will include little representative milling wheats.

Effect on United States Prices

This situation, if we conceive it correctly, may profoundly affect American wheat prices in 1925–26. Durum and Pacific wheats, and low-grade flours, seem likely to follow the international price level. Representative wheats and flours, except high-grade flours milled from Canadian wheat in bond for export, are likely to be more or less above the world-market level, with due allowance for costs of shipment.

It is impossible even to suggest how large a margin will exist. If, however, as seems probable, considerable amounts of Canadian wheat are imported for United States consumption, our domestic prices for representative wheats are likely to rule substantially above Canadian prices, possibly at times, and for certain types, to the full extent of the duty, now 42 cents per bushel. Probably the highest margin will appear in the months when Canadian prices are depressed because the wheat cannot move freely into export on account of transportation difficulties and high costs of shipment. The recent upward revision in the forecast of the United States spring-wheat crop, by 21 million bushels, suggests that the pressure for imports, and consequently the margin between American and Canadian prices, will be smaller than had previously seemed probable. Subsequent revisions of the crop estimate will deserve careful attention in this connection, for relatively small changes or errors may prove to have large bearings upon prices.

In several past years the United States has been on a domestic basis for representative wheats, at least during part of a crop year. In 1923–24 this was true of hard spring wheat and high-quality hard winter wheat, when even with a United States crop nearly 100 million bushels larger than this year, 13 million bushels of Canadian wheat were imported for domestic consumption over a duty of 30 cents per bushel.[1] Since the deficiency is in winter wheat this year, it is conceivable that imports may be sought from Argentina as well as from Canada.

The closest analogy to the present year is afforded by the crop year 1904–05. The 1904 crops were seriously deficient in the United States and to some extent in Canada also. The deficiency was greatest, however, in winter wheats. The revised figure for the American crop of 1904 is 597 million bushels, and the unrevised figures were 333 millions of winter wheat and 219 millions of spring wheat. Exports during the crop year were only 44 million bushels, almost all in the form of flour. Imports, over the tariff of 25 cents per bushel, were 3.3 million bushels. Close comparisons of prices are rendered impossible by deficiencies in avail-

[1] See Wheat Studies, December 1924, I, 27 f, 42.

able data, but it is clear that during most of the year prices at Minneapolis, Chicago, and Kansas City were from 10 to 20 or even 25 cents above Winnipeg prices. If this was true in a year of short Canadian crops, a higher differential is conceivable this year, with a large crop in Canada and a much higher duty.

These observations must not be interpreted to mean that American wheat prices will normally be higher than their present levels to the extent of the tariff duty. On the one hand, world prices may be higher or lower than at present. On the other hand, prices in the United States already "discount" this situation to some degree. The margin between United States prices and world prices will vary during the year, and the world level itself will change. But it seems safe to assume that American prices of representative wheats will not be on an export basis for much of the year, and that a substantial differential over Canadian prices will prevail.

Conclusions on Trade and Price Outlook

International trade in wheat promises to be of much smaller dimensions in 1925–26 than in either of the two preceding crop years. In particular, the transoceanic trade will probably be materially reduced, for a considerable fraction of European import requirements, probably over 100 million bushels, will be supplied from North Africa, the Danube basin, and Russia. Moreover, since European crops are good and prompt, while the United States winter-wheat crop (from which heavy autumnal shipments are usually made) is small and is being marketed slowly, this trade is likely to be smaller in the early autumn than in the same period of either of the past two years. Since the Canadian crop is fairly prompt, European demands seem likely to call forth relatively heavy autumnal shipments from Canada, and these will be supplemented by Argentine and Russian shipments.

So far as world prices are concerned, the indications are in favor of a reduction, rather than an advance, from the levels prevailing in August 1925; but the prospects for new crops in Argentina and Australia and the development of Russian exports will be important price factors. On the other hand, the indications are that for much of the year 1925–26, the United States will be on a domestic basis for representative wheats and will be importing appreciable quantities of premium wheat from Canada for domestic consumption. Hence prices of representative wheats here are likely to be out of line with world prices, though they may not be raised by the full extent of the duty. In view of the good quality of American winter wheat, premiums for quality are likely to be lower than in recent years. Prices of durum wheat and Pacific wheat, however, seem likely to be on an export basis, and these wheats will probably be employed for domestic uses rather more freely than is customary.

APPENDIX

TABLE I.—WHEAT PRODUCTION IN PRINCIPAL PRODUCING AREAS, PRE-WAR AND POST-WAR*

(Million bushels)

Year	United States	Canada	Argentina	Australia	British India	Roumania	Hungary	Bulgaria	Jugo-Slavia	Russia
1909–13 ave.[a]	690.1	197.1	147.1	90.5	351.8	158.7	71.5	37.8	62.0	758.9
1920–24 ave.	837.1	340.0	196.2	134.8	346.4	80.9	53.0	32.3	51.6	292.9
1920	833.0	263.2	156.1	145.9	377.9	61.3	38.3	30.0	43.0	318.2[b]
1921	814.9	300.9	191.0	129.1	250.4	78.6	52.7	29.2	51.8	204.7[b]
1922	867.6	399.8	195.8	109.5	367.0	92.0	54.7	37.7	44.5	279.2[b]
1923	797.4	474.2	247.0	125.5	372.7	102.3	67.7	36.2	61.1	330.5[b]
1924	872.7	262.1	191.1	164.0	363.9	70.4	51.6	28.3	57.8	332.0
1925[c]	700.0	391.8	—	—	324.7	106.5	66.1	43.5	—	664.0

Year	Algeria	Tunis	Morocco	Egypt	United Kingdom	France	Germany	Italy	Belgium	Nether-lands
1909–13 ave.[a]	35.2	6.2	17.0	33.7	59.6	325.6	131.3	184.3	15.2	5.0
1920–24 ave.	22.8	6.9	19.6	36.0	60.8	272.3	91.6	178.4	12.3	6.3
1920	8.4	5.2	17.9	31.7	56.8	236.9	82.6	141.3	10.3	6.0
1921	34.9	10.6	23.2	37.0	73.8	323.5	107.8	194.1	14.5	8.6
1922	17.0	3.7	12.9	36.6	65.2	243.3	71.9	161.6	10.6	6.2
1923	36.4	9.9	20.0	40.7	58.5	275.6	106.4	224.8	13.4	6.2
1924	17.2	5.2	23.9	34.2	52.6	282.3	89.2	170.1	12.6	4.6
1925[c]	40.3	8.7	21.1	36.6	48.0[d]	297.0	107.0	224.1	—	5.2

Year	Switzer-land	Spain	Portugal	Scandi-navia	Austria	Czecho-Slovakia	Poland	Baltic States	Greece	Japanese Empire
1909–13 ave.[a]	3.3	130.4	11.8	14.7	12.8	37.9	63.7	5.2	16.3	32.2
1920–24 ave.	3.2	137.6	10.2	19.2	7.3	33.4	37.0	5.1	11.0	38.7
1920	3.6	138.6	10.4	18.7	5.4	26.4	22.7	3.3	11.2	41.3
1921	3.6	145.2	9.4	24.4	6.5	38.7	37.4	4.5	11.2	39.5
1922	2.3	125.5	9.8	19.3	7.4	33.6	42.5	5.7	9.6	40.0
1923	3.6	157.1	13.0	20.5	8.9	36.2	49.7	6.0	13.4	37.2
1924	3.1	121.8	8.6	13.2	8.5	32.2	32.5	6.1	9.7	35.8
1925[c]	—	129.1	—	—	—	—	51.4	—	—	47.0

* Sources: *Foreign Crops and Markets*, and U. S. Department of Agriculture press releases.

[a] Including U. S. Department of Agriculture estimates for area within post-war boundaries. Russian figures include Asiatic territory. [b] Including Siberia and Kirghisia but not complete for Asiatic Russia.

[c] Forecast or early estimates, except for British India. [d] England and Wales only; corresponding figure in 1924 was 49.8.

TABLE II.—RYE PRODUCTION IN PRINCIPAL PRODUCING AREAS, PRE-WAR AND POST-WAR*

(Million bushels)

Year	United States	Canada	Russia	Roumania	Hungary	Bulgaria	Jugo-Slavia	France	Germany	Italy
1909–13 ave.[a]	36.1	2.1	743.5	20.6	31.4	7.5	9.0	52.5	368.3	6.3
1920–24 ave.	70.4	20.4	543.0	8.6	24.5	6.2	5.8	38.8	231.3	5.8
1920	60.5	11.3	368.9[b]	9.4	20.6	6.3	6.1	34.5	194.3	4.5
1921	61.7	21.5	403.1[b]	9.1	23.2	6.1	6.2	44.4	267.6	6.5
1922	103.4	32.4	569.3[b]	9.2	25.1	7.5	4.5	38.4	206.0	5.6
1923	63.1	23.2	749.9[b]	9.4	31.3	6.9	5.9	36.5	263.0	6.5
1924	63.4	13.8	624.0	6.0	22.1	4.4	6.4	40.3	225.6	6.1
1925[c]	52.0	15.8	768.0	7.1	30.3	7.4	—	—	301.9	6.3

Year	Belgium	Nether-lands	Spain	Portugal	Scandi-navia	Austria	Czecho-Slovakia	Poland	Baltic States	Twelve European producers
1909–13 ave.[a]	23.6	16.4	27.6	3.0	45.0	23.8	63.5	218.9	56.0	733.6
1920–24 ave.	19.7	15.4	27.3	5.1	35.4	13.6	47.5	163.5	45.6	515.1
1920	18.2	14.8	27.8	5.2	36.6	10.1	32.9	73.7	34.6	376.5
1921	21.3	15.0	28.1	4.6	39.9	13.2	53.7	167.6	48.5	557.4
1922	18.4	17.1	26.3	5.3	37.8	13.6	51.1	197.4	47.4	530.1
1923	20.8	14.6	28.1	5.4	40.3	15.8	53.4	234.7	52.4	630.6
1924	19.7	15.6	26.3	5.0	21.9	15.4	46.4	143.9	45.3	480.7
1925[c]	—	16.5	30.9	—	—	—	—	239.0	—	682.6

* Sources and notes as for Table I.

TABLE III.—UNITED STATES WHEAT CROP CONDITION ESTIMATES, PRE-WAR AND POST-WAR*

(Percentages of normal)

Date	1909–13 average	1921	1922	1923	1924	1925
			(A) WINTER WHEAT			
Dec. 1	88.7	87.9	76.0	79.5	88.0	81.0
Apr. 1	83.7	91.0	78.4	75.2	83.0	68.7
May 1	84.7	88.8	83.5	80.1	84.8	77.0
June 1	79.8	77.9	81.9	76.3	74.0	66.5
Harvest	79.1	77.2	77.0	76.8	77.9	65.9
Yield per acre (*bu.*)	15.6	13.8	13.8	14.5	16.2	12.7
			(B) SPRING WHEAT			
June 1	94.4	93.4	90.7	90.2	82.3	87.1
July 1	78.2	80.8	83.7	82.4	81.9	88.1
Aug. 1	75.4	66.6	80.4	69.6	79.7	73.9
Harvest	74.9	62.5	80.1	65.1	82.3	75.0[a]
Yield per acre (*bu.*)	13.3	10.6	14.1	11.2	15.9	13.4[a]

* Sources: *Agriculture Yearbook, 1923*, p. 606; *Crops and Markets;* and press releases.

[a] September 1 estimate.

TABLE IV.—CANADIAN WHEAT PRODUCTION FORECASTS AND ESTIMATES, 1921–25*

(Million bushels)

Date	1921	1922	1923	1924	1925
June 30	309	339	366	319	365
July 31	288	321	383	282	375
Aug. 31	294	389	470	292	392
Oct. 31	330	391	470[a]	272	—
Dec. 31	301	400	474	262	—

* Sources: Canadian Dominion Bureau of Statistics, *Monthly Bulletin of Agricultural Statistics* and press releases.

[a] Figure for September 30. No October 31 estimate reported.

TABLE V.—WHEAT RECEIPTS AT PRIMARY MARKETS IN THE UNITED STATES AND AT FORT WILLIAM AND PORT ARTHUR, CANADA, MONTHLY, CROP YEARS 1920–25*

(Million bushels)

Month	United States primary markets					Fort William and Port Arthur					Month
	1920–21	1921–22	1922–23	1923–24	1924–25	1920–21	1921–22	1922–23	1923–24	1924–25	
Aug.	39.6	68.6	60.6	65.3	93.0	4.9	3.2	3.7	2.0	1.3	Aug.
Sept.	42.7	61.4	57.7	45.3	82.1	12.6	27.5	37.0	28.3	7.1	Sept.
Oct.	44.6	41.6	48.3	40.5	88.0	32.0	46.2	65.1	67.0	40.9	Oct.
Nov.	37.2	25.6	42.5	37.2	60.5	33.4	40.8	56.8	72.5	42.7	Nov.
Dec.	31.6	24.0	45.3	28.4	36.3	27.9	23.0	32.0	51.9	20.3	Dec.
Jan.	29.0	17.5	37.6	15.9	24.7	7.8	7.7	11.6	12.7	4.1	Jan.
Feb.	21.2	22.7	21.6	19.8	19.9	4.5	4.2	3.2	3.9	6.2	Feb.
Mar.	22.6	20.2	21.7	18.0	17.3	4.4	9.0	6.0	2.5	8.5	Mar.
8 months	268.5	281.6	335.3	270.4	421.8	127.5	161.6	215.4	240.8	131.1	*8 months*
Apr.	23.3	15.6	21.9	10.1	10.4	3.7	6.1	7.6	6.4	8.1	Apr.
May	27.0	29.1	16.7	15.4	17.7	4.4	11.7	10.6	15.8	7.1	May
June	30.2	21.0	18.2	16.4	21.9	3.6	5.6	6.9	21.2	4.1	June
July	62.0	39.5	33.8	35.1	41.8	4.2	5.4	6.0	13.1	6.7	July
4 months	142.5	105.2	90.6	77.0	91.8	15.9	28.8	31.1	56.5	26.0	*4 months*
GRAND TOTAL	411.0	386.8	425.9	347.4	513.6	143.4	190.4	246.5	297.3	157.1	GRAND TOTAL

* Sources: U. S., *Survey of Current Business;* Canada, *Canadian Grain Statistics.*

TABLE VI. — WHEAT RECEIPTS AT PRIMARY MARKETS IN THE UNITED STATES, AND AT FORT WILLIAM AND PORT ARTHUR, CANADA, WEEKLY, APRIL TO JULY, 1925*

(Thousand bushels)

Week ending	United States primary markets	Week ending	Fort William and Port Arthur
Apr. 4	2,902	Apr. 3	1,645
11	1,797	10	1,019
18	2,839	17	709
25	1,952	24	2,395
May 2	2,848	May 1	4,141
9	3,186	8	3,380
16	2,879	15	2,127
23	5,192	22	2,192
30	5,453	29	2,066
June 6	5,748	June 5	1,946
13	4,833	12	1,436
20	4,614	19	1,687
27	5,021	26	1,458
July 4	4,952	July 3	1,525
11	7,589	10	2,304
18	7,747	17	2,321
25	11,668	24	1,996
Aug. 1	13,773	31	1,323

* Sources: U. S., *Price Current-Grain Reporter;* Fort William and Port Arthur, *Canadian Grain Statistics.* For earlier data, see WHEAT STUDIES, February 1925, I, 118, and April 1925, I, 168.

The Canadian data, while useful in showing the course of the movements, are not compiled in the same way as the monthly data given in Table IV, and are not wholly consistent with them.

TABLE VII.—BROOMHALL'S ESTIMATES OF INTERNATIONAL SHIPMENTS OF WHEAT AND FLOUR, PRE-WAR AND POST-WAR, FOR THE PERIOD AUGUST 1 TO JULY 31*

(Million bushels)

Area	5-yr. ave. 1909–14	1921–22	1922–23	1923–24[a]	1924–25
North America	206.2	404.0	455.1	454.4	422.6
Argentina and Uruguay	82.1	118.3	138.3	174.4	121.4
Australia	54.5	110.8	47.8	77.9	117.1
Russia, Danube, and Black Sea	224.7	5.6	6.9	36.0	13.5
British India	46.9	0.2	26.1	17.4	31.7
Other countries	8.0	8.1	2.1	15.1	8.9
Total	622.5	647.1	676.4	775.2	715.2[b]
To Europe	540.8	546.7	585.9	626.5	639.7
Ex-Europe	81.7	100.4	90.5	148.7	75.5
Aug. 1 to Mar. 31: total[c]	406.5	441.0	444.7	502.3	527.2
Apr. 1 to July 31: total[d]	216.0	206.1	231.7	272.9	188.0

* Source: Broomhall's *Corn Trade News.*

[a] For 53 weeks.

[b] Broomhall states that about 16 million bushels should be added to this for shipments across frontiers within Central Europe.

[c] First 34 weeks of crop year; see WHEAT STUDIES, April 1925, Appendix Table IV.

[d] Difference between reported total for year and total for first 34 weeks. The 1924–25 figure is somewhat exaggerated since Broomhall's reported total for that year exceeds the total of the 52 weekly items by 11 million bushels.

TABLE VIII.—NET EXPORTS OF WHEAT AND FLOUR FROM PRINCIPAL EXPORTING COUNTRIES, PRE-WAR AND POST-WAR*

(Million bushels)

Year or month	Total including July–June for U. S.	United States July–June	Total Aug.–July	United States Aug.–July	Canada Aug.–July	Argentina Aug.–July	Australia Aug.–July	British India Aug.–July
5-yr. ave. 1909–14	388.6	103.4	395.4	110.2	95.6	84.7	55.1	49.8
1920–21	643.1	309.7	651.8	318.4	165.8	63.6	88.9	15.1
1921–22	666.8	262.5	655.5	251.2	185.4	118.1	114.6	(13.8)[a]
1922–23	699.7	202.1	697.2	199.6	279.3	139.4	50.3	28.6
1923–24	752.7	128.4	751.1	126.8	346.4	172.2	85.6	20.1
1924–25	728.1	251.9	729.9	253.7	191.9	122.4[b]	124.3[b]	37.6[b]
1924 Aug.	49.7	21.0	49.7	21.0	11.0	9.1	5.6	3.0
Sept.	63.9	38.9	63.9	38.9	14.6	5.4	3.4	1.6
Oct.	88.3	53.1	88.3	53.1	19.4	7.2	3.7	4.9
Nov.	77.1	34.8	77.1	34.8	31.0	4.6	2.0	4.7
Dec.	71.8	23.6	71.8	23.6	33.5	7.4	3.7	3.6
1925 Jan.	60.9	12.6	60.9	12.6	10.0	19.6	14.3	4.4
Feb.	67.5	10.1	67.5	10.1	7.8	21.6	21.7	6.3
Mar.	66.5	16.1	66.5	16.1	10.6	16.4	20.3	3.1
Apr.	52.6	12.4	52.6	12.4	8.1	11.6	19.8	0.7
May	52.5	12.3	52.5	12.3	17.0	6.6	15.4	1.2
June	43.3	10.7	43.3	10.7	12.2	6.8	9.9	3.7
July	34.0[c]	6.3[c]	35.8	8.1	16.7[d]	6.1[b]	4.5[b]	0.4[b]

* Sources: *Monthly Summary of Foreign Commerce of the United States,* and figures from the Department of Commerce; *International Yearbook of Agricultural Statistics and International Crop Report; Monthly Report of the Trade of Canada;* and *Canadian Grain Statistics.*

[a] Net imports. [b] July estimated from Broomhall's shipments.

[c] United States exports for July 1924, not July 1925. [d] Total exports.

TABLE IX.—NET IMPORTS OF WHEAT, INCLUDING FLOUR AS WHEAT, BY PRINCIPAL IMPORTING COUNTRIES, MONTHLY, AUGUST 1924 TO JUNE 1925*

(Million bushels)

Month	United Kingdom	Irish Free State	France	Germany	Italy	Beligum	Nether-lands	Switzer-land	Denmark
1924 Aug.	23.42	2.27	6.00	1.35	5.45	3.38	1.87	1.12	.44
Sept.	17.94	1.09	4.23	3.29	2.59	3.92	1.87	.67	.40
Oct.	20.01	1.59	4.08	8.33	2.71	4.20	3.88	.70	.71
Nov.	21.03	2.13	4.01	12.00	5.03	2.85	2.77	1.57	.95
Dec.	20.38	2.28	2.88	9.38	8.66	3.52	3.23	2.29	1.07
1925 Jan.	14.47	1.53	.75	7.13	10.02	} 5.81	1.80	2.72	.54
Feb.	11.62	1.28	1.41	4.57	9.23		1.68	.80	.32
Mar.	15.89	1.45[a]	1.17	3.86	10.63	2.63	1.36	.97	.43
Apr.	15.12	1.30[a]	1.20	5.24	13.24	—	1.70	.93	.69
May	16.05	1.57[a]	.66	6.58	10.91	—	2.27	.57	.69
June	15.38	1.43	1.86	8.09	6.16	2.70	2.12	.59	—

Month	Sweden	Norway	Austria	Czecho-Slovakia	Latvia	Finland	Esthonia	Greece	Egypt
1924 Aug.	.91	.13	1.56	2.21	.21	.33	.03	2.08	.42
Sept.	.91	.35	1.52	2.61	.16	.30	.02	2.01	.54
Oct.	.77	.92	2.02	2.73	.23	.51	.06	1.91	.80
Nov.	1.06	.92	1.06	3.20	.20	.44	.08	2.06	.81
Dec.	.97	.53	3.32	2.11	.08	.48	.13	1.54	.68
1925 Jan.	.63	.35	} 1.47	1.65	.14	.43	.12	1.93	1.12
Feb.	.99	.70		1.47	.14	.29	.08	1.79	1.04
Mar.	1.14	.64	.89	1.52	.19	.29	.10	1.55	.90
Apr.	1.16	.15	} 3.02	1.30	.15	.26	.06	1.52	.96
May	.86	.31		1.30	.14	.31	.06	1.92	.77
June	—	—		1.21	—	—	—	1.51	—

* Sources: Official statistics, *International Crop Reports.*
[a] Broomhall's *Corn Trade News.*

TABLE X.—BROOMHALL'S ESTIMATES OF VISIBLE WHEAT SUPPLIES ON AUGUST 1, 1920–25, COMPARED WITH PRE-WAR AND POST-WAR AVERAGES*

(Million bushels)

	1920	1921	1922	1923	1924	1925	1910–14 5-yr. ave.	1920–24 5-yr. ave.
United States—wheat								
East of Rockies	31.0	46.3	34.1	58.7	58.4	47.5	48.5	45.7
West of Rockies	3.0	2.2	1.6	3.9	4.1	1.4	1.8	3.0
Canada—wheat	7.6	8.7	19.1	13.9	31.3	23.3	10.2	16.1
U. S.—flour as wheat	8.7	7.7	7.4	10.7	9.6	8.3	8.5	8.8
Canada—flour as wheat	.6	.2	.2	.2	.3	.2	.6	.3
Total North America	50.9	65.1	62.4	87.4	103.7	80.7	69.6	73.9
Argentina	3.7	3.7	2.2	4.4	6.8	8.5	1.3	4.2
Australia	27.5	30.0	3.0	18.0	30.0	8.4	[a]	21.7
Total Argentina and Australia	31.2	33.7	5.2	22.4	36.8	16.9	[a]	25.9
United Kingdom—wheat	10.0	6.4	5.2	7.0	8.4	} 9.2	12.4	7.4
United Kingdom—flour as wheat	2.8	1.2	1.9	1.2	1.5		3.0	1.7
Afloat for United Kingdom	24.9	18.5	12.3	14.1	14.4	8.1	13.9	16.8
Afloat for Continent	39.9	28.8	22.3	18.2	15.2	14.2	12.3	24.9
Afloat for orders	11.4	10.6	14.3	6.7	12.2	10.1	9.0	11.0
Total United Kingdom and afloat	89.0	65.5	56.0	47.2	51.7	41.6	50.6	61.8
Grand total	171.1	164.3	123.6	157.0	192.2	139.2	[a]	161.6
Excluding Australia	143.6	134.3	120.6	139.0	162.2	130.8	120.4	139.9

* Source: Broomhall's *Corn Trade News* and *Daily Market Record.*
[a] Data incomplete.

TABLE XI.—WHEAT SUPPLIES AND THEIR APPROXIMATE DISPOSITION IN LEADING EXPORT COUNTRIES, 1922–25*

(Million bushels)

(*A*) UNITED STATES:
CROP YEARS ENDING JUNE 30

	1922–23	1923–24	1924–25
Stocks, July 1	81.5	102.4	106
New crop	867.6	797.4	873
Supplies	949.1	899.8	979
Exports of wheat	154.9	78.8	195
Exports of flour	67.0	77.6	63
Imports (less re-exports), of wheat and flour	19.7	27.9	6
Net exports, wheat and flour	202.2	128.5	252
Shipments to possessions	2.8	2.9	3
Seed requirements	91.4	79.4	88
Domestic milling	550.3	496.1	477
Feed and waste		87.2	72
Total domestic use	641.7	662.7	637
Stocks, June 30	102.4	105.7	87

(*B*) CANADA:
CROP YEARS ENDING AUGUST 31 AND JULY 31

	1922–23 Sept.–Aug.	1923–24 Sept.–Aug.	1924–25 Aug.–July
Stocks, Sept. 1 (Aug. 1)	16.0	8.9	39.1
New crop	399.8	474.2	262.1
Supplies	415.8	483.1	301.2
Exports, wheat and flour	279.1	342.8	191.9
Seed requirements	39.8	38.6	38.6
Milled for consumption	40.9	41.5	35.5
Feed and waste	47.1	34.0	12.6[a]
Total domestic use	127.8	114.1	86.5
Stocks, Aug. 31 (July 31)	8.9	26.2	22.6

(*C*) ARGENTINA:
YEARS ENDING JULY 31

	1922–23	1923–24	1924–25
Stocks, Aug. 1	66.6	54.2	60
New crop	195.8	247.0	191
Supplies	262.4	301.2	251
Exports, wheat and flour	142.6	173.0	122
Seed requirements	18.7	20.6	21
Consumption, feed, and waste	46.9	48.0	47
Total domestic use	65.6	68.6	68
Stocks, July 31	54.2	59.6	61

(*D*) AUSTRALIA:
YEARS ENDING JULY 31

	1922–23	1923–24	1924–25
Stocks, Aug. 1	29.8	45.4	41
New crop	109.3	125.5	164
Supplies	139.1	170.9	205
Exports, wheat and flour	49.8	85.6	124
Seed requirements	8.9	9.4	10
Consumption	30.4	31.2	32
Feed and waste	4.6	3.5	4
Total domestic use	43.9	44.1	46
Stocks, July 31	45.4	41.2	35

* Sources: In the main, official data, except for seed, feed, and waste, and, in the cases of Argentina and Australia, stocks as well. See WHEAT STUDIES, December 1924, Appendix Table VII, for sources and earlier data.

[a] We believe this item to be too low due to the underestimate of the Canadian crop.

TABLE XII.—AVERAGE DAILY VOLUME OF TRADING IN WHEAT FUTURES AT ALL MARKETS, MONTHLY, 1921–25*

(Million bushels)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1921	39.1	44.1	39.5	52.5	46.1	49.8	45.5	39.6	57.1	54.0	53.7	43.3	1921
1922	36.5	67.9	61.3	48.9	37.4	41.8	34.4	36.2	33.5	32.5	37.6	42.1	1922
1923	36.6	37.0	27.9	48.0	41.0	40.9	32.3	31.4	28.3	30.2	27.1	21.1	1923
1924	14.3	18.1	22.8	18.0	14.4	34.0	53.3	50.0	42.7	61.4	60.9	58.8	1924
1925	73.4	81.0	87.4	59.3	60.3	67.6	56.2	—	—	—	—	—	1925

* Source: U. S. Department of Agriculture, Grain Futures Administration.

TABLE XIII.—WEEKLY CASH PRICES OF REPRESENTATIVE WHEATS IN LEADING EXPORTING AND IMPORTING MARKETS, APRIL TO JULY 1925*

(U. S. dollars per bushel)

Month	United States			Canada	Argentina	Liverpool						
	No. 2 Red Winter (Chicago)	No. 2 Hard Winter (Kansas City)	No. 1 Dark Northern (Minneapolis)	No. 1 Manitoba (Winnipeg)	Barletta (Buenos Aires)	No. 1 Manitoba	No. 3 Manitoba	No. 1 Northern Duluth	No. 2 Winter	Pacific White	Argentine Rosafe	Australian
April	[a]	1.45	1.56	1.38	1.58	1.73	1.63	1.63	1.64	1.60	1.70	1.73
	[a]	1.49	1.57	1.58	1.60	1.78	1.75	1.75	1.68	1.61	1.75	1.72
	[a]	1.55	1.65	1.59	1.67	1.73	1.71	1.67	1.64	1.62	1.71	1.68
	[a]	1.50	1.62	1.60	1.69	1.79	1.65	1.63	1.72	1.62	1.68	1.74
May	1.75	1.46	1.59	1.68	1.64	1.83	1.80	1.78	1.77	1.76	1.80	1.72
	[a]	1.63	1.71	1.80	1.77	1.96	1.82	1.78	1.89	1.71	1.85	1.80
	1.84	1.59	1.69	1.82	1.74	1.99	1.90	1.84	1.86	1.69	1.89	1.80
	1.92	1.63	1.76	1.87	1.78	2.01	1.95	1.90	1.88	1.73	1.94	1.81
	1.90	1.64	1.78	1.92	1.80	2.04	—	—	1.92	1.70	—	1.80
June	1.87	1.63	1.73	1.84	1.75	2.00	1.91	1.88	1.90	1.73	1.91	1.81
	1.90	1.68	1.77	1.75	1.75	1.94	1.90	1.85	1.84	[a]	1.88	1.78
	1.86	1.60	1.67	1.67	1.63	1.85	1.76	1.70	1.72	1.67	1.71	1.62
	1.80	1.58	1.67	1.66	1.63	1.86	1.77	1.70	1.69	1.66	1.70	1.63
	—	—	—	—	—	—	1.72	1.66	—	—	1.69	—
July	[a]	1.49	1.58	1.57	1.55	1.78	1.68	1.66	1.62	1.60	1.64	1.60
	1.55	1.48	1.59	1.60	1.60	1.78	1.74	1.72	1.68	1.62	1.71	1.65
	1.63	1.55	1.70	1.71	[b]	1.82[c]	1.74	1.75	[a]	1.67[c]	1.75	1.70[c]
	1.57	1.55	1.72	1.63	[b]	1.80[c]	1.70	1.70	[a]	1.67[c]	1.76	1.72[c]
	1.58	1.55	1.70	1.57	[b]	—	—	—				

* Sources: U. S. prices from *Crops and Markets;* foreign prices from *International Crop Report and Agricultural Statistics,* except Rosafé, No. 1 Northern Duluth, and No. 3 Manitoba, which are from Broomhall's *Corn Trade News.* U. S. prices are weekly averages of daily weighted prices for weeks ending Friday. Foreign prices are for Friday of each week, except Rosafé, No. 1 Northern Duluth, and No. 3 Manitoba, which are for Tuesday.

[a] No quotation. [b] Not available. [c] Tuesday prices, July 21 and 28, from Broomhall's *Corn Trade News.*

TABLE XIV.—AVERAGE PRICES OF DOMESTIC WHEATS IN EUROPEAN MARKETS, MONTHLY, AUGUST 1924 TO JULY 1925*

Month	Great Britain	France (Chartres)	Italy (Milan)	Germany (Berlin)	Great Britain	France (Chartres)	Italy (Milan)	Germany (Berlin)
	s. d. per quarter	*francs per quintal*	*lire per quintal*	*gold mks. per quintal*	*U. S. dollars per bushel* [a]			
1924 Aug.	54–9	101.00	116.00	19.88	1.54	1.50	1.40	1.29
Sept.	51–10	106.70	125.25	22.51	1.45	1.54	1.49	1.46
Oct.	54–0	113.45	149.20	22.65	1.52	1.62	1.77	1.47
Nov.	53–10	119.05	155.50	21.20	1.56	1.71	1.83	1.37
Dec.	52–6	120.31	166.12	22.22	1.54	1.77	1.94	1.44
1925 Jan.	55–5	127.75	194.80	25.38	1.66	1.87	2.21	1.64
Feb.	58–4	131.25	206.00	25.08	1.74	1.89	2.30	1.62
Mar.	56–11	132.60	188.62	25.21	1.70	1.87	2.09	1.63
Apr.	52–7	125.00	166.25	24.72	1.58	1.77	1.86	1.60
May	54–2	131.50	174.40	26.26	1.64	1.85	1.93	1.70
June	55–1	135.00	172.88	[c]	1.67	1.75	1.80	[c]
July	51–1	128.60	158.00[b]	[c]	1.55	1.64	1.57[b]	[c]

* Sources: Great Britain, London *Economist;* France, U. S. Federal Reserve Board; Italy, *International Crop Report and Agricultural Statistics;* Germany, *Wirtschaft und Statistik.*

[a] Conversions made at average exchange rates for the month. [b] Average for first two Fridays of July.

[c] Not available.

This issue has been written chiefly by Joseph S. Davis and Katherine Snodgrass, with substantial assistance from Alonzo E. Taylor and E. Gail Benjamin.

WHEAT STUDIES

OF THE

FOOD RESEARCH INSTITUTE

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